Harnessing the Impact of Schools: New Insights for Sustainable Community Development

by

Tamara Hope Lawless

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Graduate Supervisory Committee:

Aaron Golub, Chair
Charles Redman
Daniel Schugurensky

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ABSTRACT

This dissertation explores the unique role schools play in contributing toward a sustainable future for their communities. This was undertaken by first conducting a thorough review and analysis of the literature on the current utilization of schools as agents of sustainable development, along with an evaluation of schools engaging in this model around the United States. Following this, a framework was developed to aid in the assessment of school-community engagements from the perspective of social change. Sustainability problem solving tools were synthesized for use by schools and community stakeholders, and were tested in the case study of this dissertation. This case study combined methods from the fields of sustainable development, transition management, and social change to guide two schools in their attempts to increase community sustainability through addressing a shared sustainability problem: childhood obesity. The case study facilitated the creation of a sustainable vision for the Phoenix Metropolitan Area without childhood obesity, as well as strategic actions plans for each school to utilize as they move forward on addressing this challenge.

Keywords: sustainability, sustainability problem solving, school-community engagement, childhood obesity, stakeholder engagement, action research

DEDICATION

I could not have completed my doctorate without the love and support and my family and friends. I'm sorry that I've been so out of touch these past four years, please know that you were always in my thoughts and prayers. This dissertation is dedicated to, in no particular order:

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Harnessing the Impact of Schools: New Insights for Sustainable Community Development

Chapter 1: Introduction

This dissertation examines how K-12 schools and their communities can work together to tackle sustainability problems. In particular, the specific sustainability problem this dissertation addresses is childhood obesity and the role schools can play in its mitigation. This problem was selected through an action research process in which two participating schools both identified childhood obesity as the most pressing sustainability challenge faced by Phoenix Metropolitan Area schools. The dissertation proposes a framework for school-community cooperation to solve childhood obesity, and tests it using action research with teachers, administrators, students, and community members at two K-12 schools in the Phoenix Metropolitan Area. The action research sought to test the hypothesis that given sustainability problem solving tools, school stakeholders can create a sustainable long-term plan to aid their community in the mitigation of childhood obesity.

1.1 Framing the Dissertation in Sustainability Science and Action Research

The field of sustainability has emerged in response to global crises such as social unrest, environmental degradation, and dwindling supplies of natural resources (Clark, 2007; Du Pisani, 2006; B. R. W. Kates, Parris, & Leiserowitz, 2005; Orr, 2002). These so-called "wicked problems" are complex and systemic; there is no panacea that will solve them all in one fell swoop (Farley, 2007). To address these wicked problems, sustainability scientists utilize a

variety problem solving tools and approaches that allow them to examine the problems from multiple perspectives, at a variety of scales, and in collaboration with a diverse range of stakeholders (Wiek, Withycombe, & Redman, 2011). These stakeholders may be individual actors, institutions, corporations, governments, or NGOs, depending on the sustainability problem in question. This dissertation is focused on K-12 schools as stakeholders affected by sustainability problems, and how they can collaborate with their communities to find solutions.

This emerging field provides the foundation from which this body of work is structured. The problem solving methods from sustainability science shape the dissertation by providing the selection of tools from which it draws. Additionally, the philosophy and methodology of the action research field, because of its commitment to actionable knowledge and empowerment was a guiding force for the research process (Reason & Bradbury, 2008). The overarching question this dissertation seeks to answer is whether or not schools are capable of addressing complex sustainability problems through the translation of sustainability science theory into actionable long-term plans.

The dissertation contributes to these fields by providing a bridge between theory and practice through a case study with two Phoenix Metropolitan Area schools. The schools agreed to explore this translation of theory into practice through the utilization of sustainability science methods in crafting long term plans for mitigating a shared sustainability challenge: childhood obesity. Childhood obesity was identified by the school case study participants as one of the most pressing sustainability challenges faced by school in the Phoenix Metropolitan Area. As an illustration of this, in one of the two case study schools, 50% of children were found to be in overweight or obese BMI ranges. Childhood obesity is an ominous challenge for sustainability

because it has grave implications for future generations and has emerged from unsustainable practices in agriculture, urban planning, and policy making (Anderson & Butcher, 2006; Beaumont & Pianca, 2000; J. Foster, 2011).

During the creation of a sustainable long-term plan for the mitigation of childhood obesity, the schools utilized several tools from the field of sustainability science: transition management, systems analysis, and sustainability assessment. The transition management process included an extensive visioning exercise, an evaluation of the schools' current states, and the selection of action steps for future progress. In addition, the schools engaged with a system map of the childhood obesity problem, and utilized this map to evaluation their vision of a sustainable future.

1.2 Overview of dissertation chapters

This dissertation integrates sustainability problem solving tools with knowledge from the fields of behavioral change and community development. In Chapter 2, emerging sustainability science methods and problem solving tools are coupled with methods from the fields of behavioral change and community development in order to foster community transitions away from unsustainable practices and infrastructures. Chapter 3 examines the current utilization of schools as community change agents and their role in the sustainability movement. In Chapter 4, childhood obesity as a sustainability problem is discussed in full detail, and then current practices in childhood obesity mitigation are reviewed. Chapter 5 provides an in-depth description of the methods and practices that make up the approach this dissertation utilized in the action research case study process. Chapter 6 reveals the results of the case study. Chapter 7

discusses what was learned through this dissertation work and provides insight for the future. Chapter 8 provides concluding thoughts.

1.3 Research Questions and Objectives

Six research questions guided this dissertation:

1.3.1 What role are schools playing in the sustainable development of their communities? The objective of answering this question is to provide a baseline understanding for current efforts of schools in the field of sustainability, and is answered through the literature review and research conducted in Chapter 3. Additionally, this question seeks to discover insights for sustainable development based on the roles of schools and school-community relationships, and this discussion is covered in the concluding Chapter 7.

1.3.2 What framework can schools use to guide their efforts toward community sustainability? The objective to answering this question is to create a synthesis of insights and methodology from the fields of sustainability science, behavioral change, and community development in order to guide the selection of action plans during the action research case study. The synthesized frameworks are revealed in Chapter 5, and are then utilized in the case study, which is summarized in Chapter 6.

1.3.3 How can schools in the Phoenix Metropolitan area address sustainability problems like childhood obesity? The objectives in answering this question include both revealing effective actions schools can take in order to mitigate childhood obesity, as well as to reveal the best practices schools in general can use to engage in sustainability problem solving. Additionally, another objective here is to foster community sustainability through addressing a

sustainability problem that schools have a shared interest in solving. The outcome of this question is described in the research discussion and conclusions in Chapter 7.

1.3.4 What would it look like (what would the outcomes be) in Phoenix Metropolitan schools and their surrounding communities if childhood obesity was eliminated? The objective of answering this question is the facilitation of the creation of a collaborative vision for Phoenix communities that has eliminated childhood obesity, thereby becoming more sustainable. This vision is the goal toward which the action plans are striving. The outcome of this question is described in the case study outcomes in Chapter 6.

1.3.5 What can be done to the current outreach activities, educational activities, and infrastructural changes at each school to move them from our current state to our vision to solve childhood obesity? The objective of answering this question in the creation of action strategies that improve current efforts each school is making to mitigate childhood obesity. These action plans attempt to provide guidance that will progress each school closer to achieving the vision the created. The outcome of this question is described in the case study outcomes in Chapter 6

1.3.6 What are common carriers and barriers for implementation of a sustainable transition in Phoenix schools and what can other schools take away from the findings? The objective of answering this question is to reveal the transferability of the results of this case study work into the broader movement to utilize schools as leverage points for community sustainability. This is discussed in Chapters 6 and 7.

Chapter 2: Problem Solving Toolsets for Sustainability

This chapter provides an overview of sustainability science, with particular emphasis on the toolsets used to solve sustainability problems. These toolsets differentiate this dissertation and its case study work from those examining childhood obesity solely from the fields with which it is typically associated, such as public health. The framing of childhood obesity as a sustainability problem, as examined in full detail in Chapter 4, opens up the problem solving process to new insights and toolsets that have the potential to address the systemic nature of this problem. This ability, to address complex and systemic problems, is the core reason sustainability science has developed into an independent field (Clark, 2007).

The four tools described in this chapter, (the core competencies of sustainability science, Gibson's principles for sustainability assessments, transition management, social-behavioral change modeling, and action research methodologies), informed the research design of this dissertation by providing an assemblage of best practices. In essence, the tools taken from each field indicated the optimal steps to take in order to solve a problem in that arena. The tools from sustainability science provide guidance for solving sustainability problems, the tools from behavioral science provide guidance for solving behavioral problems, and the tools from transition management provide guidance for solving problems of large-scale paradigm shifts.

When combined, these disparate tools create a toolset unique to this dissertation work. This is one of the many benefits of engaging in research that is interdisciplinary: unique problems can be solved with similarly unique methods by bringing many fields and elements together.

2.1 Transition Management

Transition management, an emerging method for creating solutions to sustainability problems, emerged as an alternative to traditional problem-solving methods, which were inadequate in addressing complex "wicked" problems (Loorbach, 2007). Transitions are defined as transformation processes in which existing structures, institutions, cultures, and practices are broken down and new ones are established in their place (Loorbach & Rotmans, 2010; Loorbach, 2007). These transitions are long-term holistic change processes, and in theory respond not only to the symptoms of sustainability problems but also to the actual source. This is a response to other participatory problem solving methods, which attempt to tackle problems without ensuring that their interventions are actually leading toward the future they desire. There will always be more than one way to solve a specific problem, and transition management attempts to narrow down these choices to only those that both solve the problem and move the system in a more sustainable direction. Transition management methodology includes crafting a vision of the desired future, assessing the system and problem as they exist now, and coming up with strategies for moving the system from the current state to the vision. This process is iterative (as opposed to linear) and is steered by adaptation and anticipation.

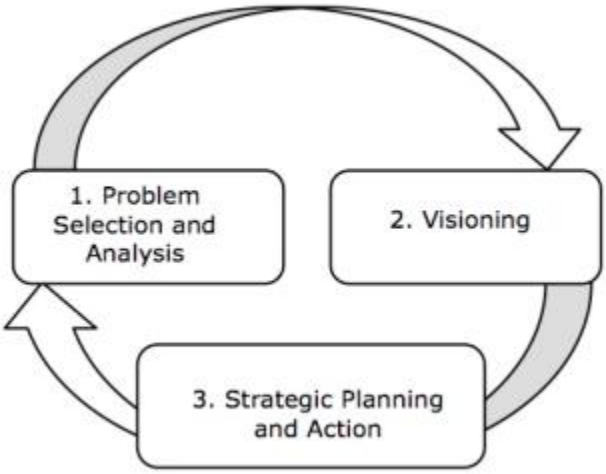

Figure 1: Simplified model of transition management process

An essential underlying principle in the process is to reflect on the future and then be flexible enough to make adjustments along the way. The paradox is, if a system is so complex that we can scarcely understand it, how can we hope to change it? The flexibility and iteration of the approach allows for the chaos, full understanding is not as important as readiness for response. Stakeholder engagement is an essential component of good transition management, since all stakeholders are both embedded in and drivers of the system (Barker, 2002; D. Foster & Jonker, 2005). And because all stakeholders are part of the system, they each have unique pieces of knowledge to contribute toward creating solutions. An overview of each of these steps is provided below.

2.1.1 Problem selection and analysis. This is, in essence, a snapshot of the problem as it exists at the moment before any attempts to solve it begin. An in-depth depiction of the current state requires utilization of the systems-thinking competence, because both the visible components of the problem and the unseen forces behind the problem must be recognized. It is essential to ask *why* the problem is occurring rather than simply asking *what* is occurring.

Additionally, different scales and perspective must be considered, starting with the individual actor and progressing all the way up through the community, political system, and culture (Loorbach & Rotmans, 2010; Redman, Grove, & Kuby, 2004; Rotmans & Loorbach, 2009). The richer the picture the better, for it will provide guidance during the selection of indicators for monitoring progress (R. W. Kates, 1999; Park, Purcell, & Purkis, 2009).

2.1.2 Visioning. If the current state is a snapshot of the problem as-is, the vision is a snapshot of a future without the problem. A long-term vision is the starting point that inspires action and guides decision making (Newman & Jennings, 2008; Park et al., 2009). Building shared intention through visioning helps stakeholders articulate their aspirations and develop a deeper understanding of what is required for a sustainable future. Visions are meant to be about dreams, imagination, passion, and creativity. Stakeholders are encouraged to think outside what they perceive to be currently feasible. It is impossible to make big change if all we see is what is likely to happen if the system stays the way it is. A good vision makes us think ahead and evaluate what matters, and toward these ends we build up our strategies and interventions. Visions can also be evaluated for sustainability, utilizing Gibson's principles. This ensures that the future toward which we strive is in fact more desirable than the one we are currently headed for.

2.1.3 Strategic planning and action. The strategic component of transition management is where ideas are transformed into actions. These small scale experiments are steps that push the current system from the current state toward the vision (Kemp, Loorbach, & Rotmans, 2007; Loorbach, 2007). Selecting these steps is an exercise in combining current best-practice with creativity and systemic thinking (Park et al., 2009). The vision is broken down into its smaller

parts and current practices for achieving similar goals are evaluated. Eventually, an intervention is attempted and carefully monitored. It is this monitoring that allows the transition manager to decide if the current intervention is useful or if a new intervention ought to be tried (Loorbach, 2007, 2009; Rotmans & Loorbach, 2009).

2.1.4 Iteration and response. The flexibility and adaptability of the transition management approach allow it to respond to complex systems (Loorbach, 2009; Rotmans & Loorbach, 2009). Transition managers must carefully monitor their indicators, and must re-evaluate their progress and the system periodically. Critics of transition management point out that attempting to shift any complex system from within is nearly impossible (Shove & Walker, 2007). However, proponents of the method point out that this logic results in inaction and pessimism, and that the ability to remain open minded and flexible is a much more proactive response (Rotmans & Kemp, 2008).

2.2 Sustainability Problems

The field of sustainability science has emerged in response to accelerating sustainability problems (Clark, 2007; Du Pisani, 2006; B. R. W. Kates et al., 2005; Orr, 2002). These so-called "sustainability problems" have serious implications for humanity's continued existence on this planet. They are complex and systemic and therefore cannot be solved through traditional problem solving methods. Rather, they require that disparate fields and sectors, nations and regions, governments and industries, collaborate together to approach these challenges from all angles(Clark, 2007). These challenges are often the result of years of human history and behavior, and thus changing course is a massive undertaking. Some prominent examples include

climate change, widespread environmental degradation, extreme poverty and hunger, and a widening gap in resource distribution (United Nations, 2008).

These widespread challenges sparked a desire to promote social change, in hopes that over time humanity's trajectory might be transitioned onto a path that preserves rather than degrades the socio-ecological system (Kemp & Loorbach, 2003). As actors and stakeholders from various fields began their collaboration on sustainability problems, a dialogue emerged in regards to the tools and competencies essential for tackling these widespread and systemic challenges. These "core competencies" are sets of knowledge, skills, and attitudes that enable sustainability scientists to analyze and solve sustainability problems, as well as to prepare for future sustainability challenges (Wiek et al., 2011).

2.3 Sustainability Science – Core competencies

The core competencies provided insight into the skills required to address sustainability challenges like childhood obesity. An overview of these essential competencies is provided below.

2.3.1 Systems-thinking competence. The concept of sustainability necessitates the ability to see the interconnectedness between all actions, all domains, all pieces of the socio-ecological system and the understanding that there are always cascading effects and unanticipated outcomes from any change in the system (Meadows, 2009). The systems-thinking competence is the ability to analyze a system from many perspectives and scales, while looking for systemic interactions like feedback loops and causal relationships (Hjorth & Bagheri, 2006;

Wiek et al., 2011). This requires more than simple observations of how the system appears to work, and requires exploration of the forces behind the scenes so to speak. These forces may be structural, such as those that result from system inertia, or social, such are those that arise from cultural and political factors.

2.3.2 Anticipatory competence. Anticipatory competence promotes the selection of solutions that are flexible and changeable, since the course of our actions must be carefully monitored to ensure that new paths are actually more desirable than those abandoned. The anticipatory competence is therefore the ability to look to the future and use creativity to attempt to foresee different outcomes from various actions (or inaction) (Wiek et al., 2011). Especially important for the anticipatory competence is an understanding of uncertainty, with an eye for unintended harmful consequences (Grunwald, 2007).

2.3.3 Normative competence. Though it can easily argued that all fields are in some ways value-laden, because they are guided either directly or inadvertently by the values of the people engaged (Frisk & Larson, 2011; Sarewitz, 2010), sustainability is particularly steeped in values because any movement away from the status quo must be justified (Wiek et al., 2011). The normative competence is the ability to acknowledge that the achievement of sustainability requires the acceptance of values and principles such as concepts of justice, equity, ethics, and social-ecological integrity (Orr, 2002; Swart, Raskin, & Robinson, 2004; Wiek et al., 2011). Sustainability requires that certain systems and practices be deemed less desirable than others, which forms the foundation upon which we decide to create change. The normative competence

allows sustainability scientists to openly acknowledge and evaluate the values that contribute to system dynamics. Additionally, desirable values and norms are used to guide future actions, and in the creation of visions of the future toward which we strive. One example of a methodological assessment of sustainability norms is the utilization of Gibson's Principles of Sustainability Assessments, described fully later in this chapter (Gibson, 2006).

2.3.4 Strategic competence. We cannot go to the store and purchase a scanner that tells us if something is sustainable or not. We can, however, measure other things that might indicate to us whether or not a system is sustainable, and these measurable items are indicators. The strategic competence is the ability to design and implement interventions in a system that alters its course from an undesirable future toward a sustainable future (de Haan, 2006; Grunwald, 2007; Wiek et al., 2011). This requires an understanding of concepts like resilience, system inertia, path dependencies, and potential barriers and carriers (Schensul, 2009). These interventions must be carefully designed and evaluated, with the inclusion of different stakeholders and perspectives. They must be monitored carefully to ensure that their projections are indeed an improvement over the previous path, which requires the ability to select suitable indicators. Indicators are measurable data points that we can use to approximate the measurement of something immeasurable (B. R. W. Kates et al., 2005; Park et al., 2009; Sachs & McArthur, 2005). A careful balancing act is required in strategic competence; one must understand the feasibility, effectiveness, and actionability of a potential intervention as well as the amount of public and financial support available to implement it (Wiek et al., 2011).

2.3.5 Interpersonal competence. The interpersonal competence is the ability to motivate, enable, and facilitate collaborative and participatory sustainability research and problem solving (Wiek et al., 2011). This requires that an individual can successfully facilitate the collaboration of stakeholders from diverse cultures, social groups, communities and fields. This competence demands that sustainability scientists understand that various actors perceive problems and solutions differently. Additionally, diverse groups have different skills and perspectives to lend to the process of creating solutions, and therefore it is essential to include those whose experiences, resources, and perspectives will result in the best possible outcomes (Mathie & Cunningham, 2005; Schensul, 2009; Seyfang & Smith, 2007). Inclusionary problem-solving practices also aid in the mitigation of intergenerational inequity, since all stakeholder groups are encouraged to participate (Barker, 2002; Fischer, 1993; Krütli, Stauffacher, Flüeler, & Scholz, 2010; Ochocka, Moorlag, & Janzen, 2010; Oels, 2003).

2.4 Gibson's Principles

The normative component of sustainability science has been the subject of some debate as the field has matured (Frisk & Larson, 2011). Sustainability requires that certain systems and practices be deemed less desirable than others, which forms the foundation upon which we decide to create change. The normative component allows sustainability scientists to openly acknowledge and evaluate the values that contribute to system dynamics. In response to this debate, Robert Gibson extracted the core requirements for progress towards sustainability by reviewing the discourse during the initial twenty years of literature in the field (Gibson, 2006). He pieced out eight core criteria for sustainability, which serve as indicators for performing

normative sustainability assessments, explored in detail below. In this dissertation, these principles provided a systematic method for assessing the sustainability of proposed actions for childhood obesity mitigation.

2.4.1 Livelihood sufficiency and opportunity. This criterion accounts for the key provisions necessary for a decent life, including physical and economic security. To meet this criterion, it is necessary to ensure that everyone has opportunities to seek improvements in their lives through satisfactory employment or other livelihood activities. One example of how to assess this criterion is through consideration of the types of employment available to a community. Is one industry dominating the market? Is this industry likely to stay in the community for a long time, or is it a short-term operation like a mine or construction project? Are these jobs available to the local community, or are outsiders edging them out of the market? Is the job fulfilling and enjoyable? Additional considerations may include the amount of income provided by different types of employment, or the training or education necessary to obtain certain positions.

2.4.2 Socio-ecological system integrity. This criterion accounts for the long-term integrity of the ecological environment, upon which all biological and social systems depend. To meet this criterion it is essential that human–ecological relations are established and maintained in a manner that ensures the long-term integrity of these socio-biophysical systems. This includes ensuring protection for the ecosystem services and life support functions upon which human and ecological well-being depends. This criterion calls for better understanding of the complex systemic implications of our own activities on both the planet and ourselves. One example of how to assess this criterion is by asking whether or not our actions are improving or degrading

the integrity of the natural world. In the book *Cradle to Cradle*, William McDonough and Michael Braungart describe the renovation of the Ford Motor Company Rouge River manufacturing complex in Dearborn, Michigan. After their work, the natural storm water management system, complete with green roof and wetlands left the water cleaner, created habitat for wildlife, and even saved the company millions of dollars (McDonough & Braungart, 2002). This is an example of development that improves the integrity of the ecosystem in which it is embedded rather than degrading from it.

2.4.3 Intragenerational equity. This criterion accounts for the elimination of equity gaps, such as those between rich and poor and also those associated with social, ethnic, or racial discrimination. To meet this criterion it is essential that we ensure that our choices and advances reduce rather than exacerbates these gaps. All people must have similar access to health care, security, social recognition, political influence, etc. We must eliminate the vast disproportion in energy and material consumption by the few at the expense of the many in order to ensure sustainable rates of natural resource consumption.

2.4.4 Intergenerational equity. This criterion addresses the effects of our actions on future generations. In order to meet this criterion, we must preserve or enhance the opportunities and capabilities of future generations to live sustainably. This means that we need to return current resource exploitation and other pressures on ecological systems and their functions to levels that are safely within the perpetual capacity of those systems. This will allow the earth to provide the resources and services future generations are likely to need. Additionally, we need to build and repair the integrity of socio-ecological systems: maintaining the diversity, accountability, broad engagement and other qualities required for long-term adaptive adjustment.

2.4.5 Resource maintenance and efficiency. This criterion accounts for sustainable and efficient use of natural and energy resources. In order to meet this criterion, we must reduce the extractive damage caused by natural resource extraction, avoid excess waste, and cut overall material and energy use per unit of benefit. In other words, we need to do more with less by ensuring the maximum efficiency of all materials and practices. This criterion is also illustrated in the book *Cradle to Cradle*, which discusses the concept of the "technical nutrient" (McDonough & Braungart, 2002). A technical nutrient cycles indefinitely within the "technosphere", acting in a similar fashion to an organic nutrient cycling indefinitely through the biosphere. A technical nutrient like copper, for example, might go from plumbing to electronics to wiring, flexibly and easily getting recycled within the technological system and never ending up in a landfill.

2.4.6 Socio-ecological civility and democratic governance. This criterion accounts for the capacity, motivation and inclination of individuals, communities, and other stakeholder groups, to contribute to democratic decision-making. In order to meet this criterion, we must build the capacity, motivation and habitual inclination of individuals, communities and other collective decision-making bodies to engage in activities that allow and empower them to make informed decisions. The participation of all stakeholders is essential in order to build a future that is desirable for all. Additionally, governance structures must be capable and willing to respond to the concerns and aspirations of an informed citizenry.

2.4.7 Precaution and adaptation. This criterion ensures that we recognize the inherent uncertainty of the future in order to avoid taking unnecessary risks. To meet this criterion, it is essential that we embrace flexible design in anticipation for surprises. This applies to physical

entities, like municipal infrastructure, and also to social structures like legislation and institutions. Design that incorporates diversity, flexibility, redundancy and reversibility is of the utmost importance. It is also essential to evaluate the availability and practicality of back-up alternatives and to establish systems that are capable of monitoring and response.

2.4.8 Immediate and long term integration. This final criterion is a call to apply all of the previous criteria at once. Due to system dynamics, changes in one area will create changes in others. We must seek alternatives that create positive change in multiple areas, allowing for positive cascading effects. We must remember that balance is different from integration, and if at all possible we should not make choices that harm one area in order to benefit another. This will require that we resist convenient immediate compromises unless they clearly promise an eventual gain.

2.5 Social Change for Sustainability

Because the intended outcome of most potential interventions used in sustainability science is social behavioral change (shifting our cultures and societies from a set of behaviors and norms that endanger the planet and our future to one that instead restores and preserves), understanding the best practices to foster this change is essential (Frisk & Larson, 2011). In order to reveal the drivers behind the decisions that have lead to the current system, it is useful to reference the literature from the fields of social and organizational change.

According to this literature, the combination of three general factors (knowledge, values, and environment) lead to choices and actions, which eventually result in outcomes (both positive and negative) (Ballard, 2005; Heath & Heath, 2010). *Knowledge* includes facts we learn, skills

and competencies we master, and ideas and strategies we form using the logical sphere of our psyche. *Values* include our cultural norms, our ethics, and the emotions we experience when our beliefs are affirmed or contradicted (Bradbury, 2003; Orr, 2002; Sipos et al., 2008). *Environment* represents the world around us: the physical infrastructure of our communities, the cultural practices that are commonplace in our social spheres, and the policies that dictate how our society operates (not to be confused with a usage that restricts its definition solely to the ecological environment) (Jackson & Sinclair, 2012). These three inputs are depicted in the simplified model below.

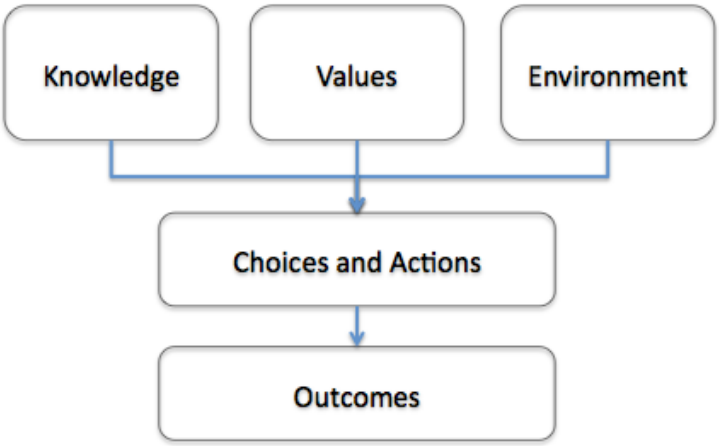

Figure 2: Simplified social behavioral change model

This model can be used as a framework with which we can evaluate sustainability interventions. Clearly, the best interventions are capable of creating change in all three areas: knowledge, values, and the environment. The question is: how can schools create change in the knowledge, values, and environments of their community?

2.6 Action Research

Traditional research models assume that research turns into action via a trickledown effect: practitioners will seek out and make use of good research without the need for additional effort from the researchers who produced it. Unfortunately there is little evidence that this actually takes place. For one, the language of traditional research is difficult for laypeople to translate into something they can actually use. Second, the ability to seek out academic sources is a skill in its own right, and therefore limited to the privileged few (Van Kerkhoff & Lebel, 2006). Action research brings researchers and stakeholders together to collaborate and generate knowledge that is intended to solve specific problems.

2.6.1 Action research and power dynamics. Action research emphasizes the dissolution of barriers between researchers and participants. Both groups share control of the research agenda through active and reciprocal involvement in the research design, implementation and dissemination. This provides training and mentoring for members of the community so that they can learn how to research; offers opportunities for meaningful involvement in a project that is intended to effect community change; produces data for advocacy; and places a high value on experiential knowledge (Ochocka et al., 2010). For many action researchers then, this democratic relationship is also a form of community empowerment. Action-oriented research also assumes that valid knowledge can originate from both academic study and community knowledge sharing. Therefore both the academic and community partners each possess unique and valuable knowledge, practices, and insights that can contribute to the success of an action-oriented research project. Researchers commonly have very specialized skill sets, specific to their own fields of study and experience. Conversely, community members will have developed

their own specific strategic skills for managing the daily problems imbedded in their own communities. Together, researchers and community partners can combine their different kinds of knowledge and skills to produce insightful and usable findings (Small & Uttal, 2005). This respect for people's knowledge and for their ability to understand and address the issues confronting them and their communities is crucial for the translation of knowledge into action for sustainability (Brydon-Miller, Greenwood, & Maguire, 2003).

2.6.2 Action research as a tool for sustainability. A transition to sustainability requires that advances in basic understanding, social capacity, and technological capability be combined with political will to foster societal change (R. W. Kates, 1999). It merges basic and applied research, and in doing so creates a bridge between knowledge and action (Clark, 2007). Because the field of sustainability is action-oriented, methods from action research can provide it with guidance for successful production of actionable knowledge. Additionally, because action research and sustainability both place high emphasis on equity and capacity building, action research methodology aligns well with sustainability norms.

2.7 Sustainability Problem Solving Toolsets: Lessons for this Dissertation

The tools described in this chapter: sustainability problem solving competencies, Gibson's principles for sustainability assessment, transition management, and models of social-behavioral change, provided the groundwork essential for the dissertation case study research.

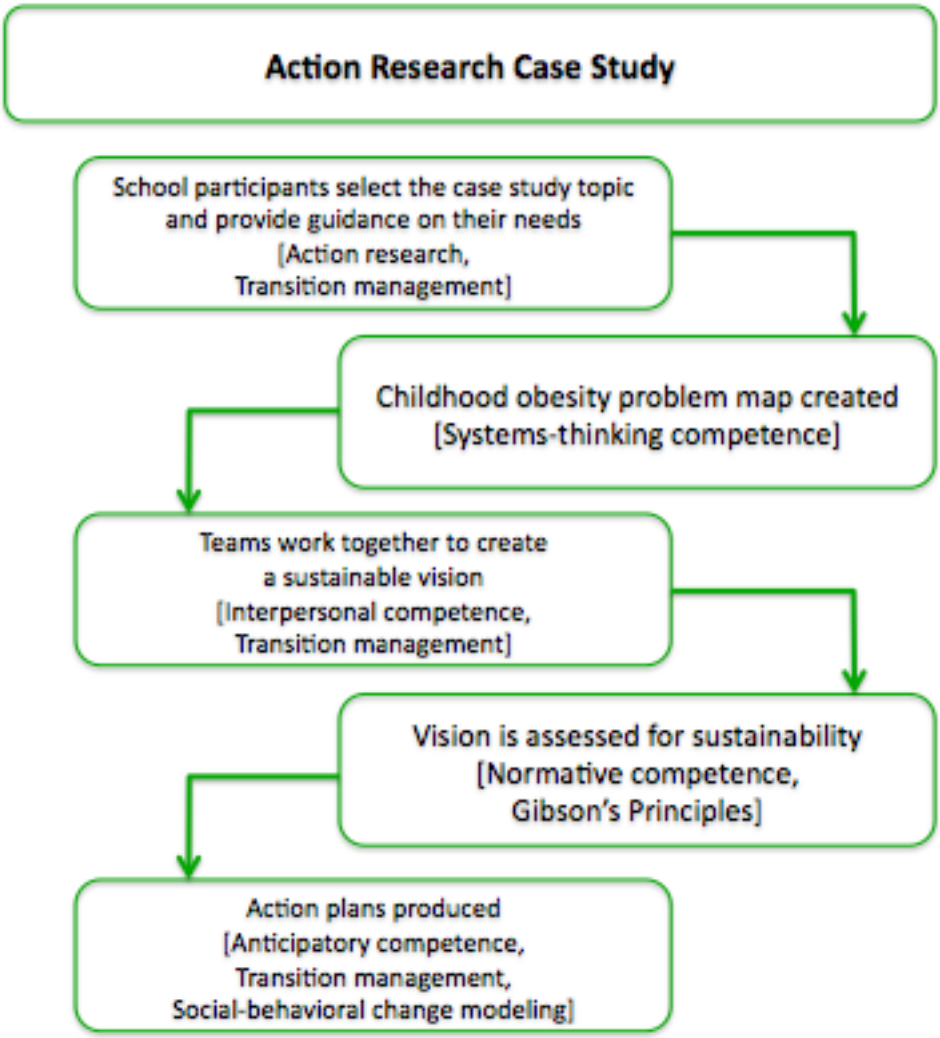

Figure 3: Overview of action research case study

The problem of childhood obesity (described fully in Chapter 4), was mapped utilizing the assistance of the systems-thinking competence. The research progression followed transition management processes, which is a utilization of anticipatory competence and strategic competence. The selected plans and actions were evaluated with Gibson's principles for sustainability assessment, which is a utilization of the normative competence. These plans and

actions were additionally prioritized for maximum impact using models of social-behavioral change. The action research process itself proved an exercise in interpersonal competence. The case study itself sits within this overall research progression.

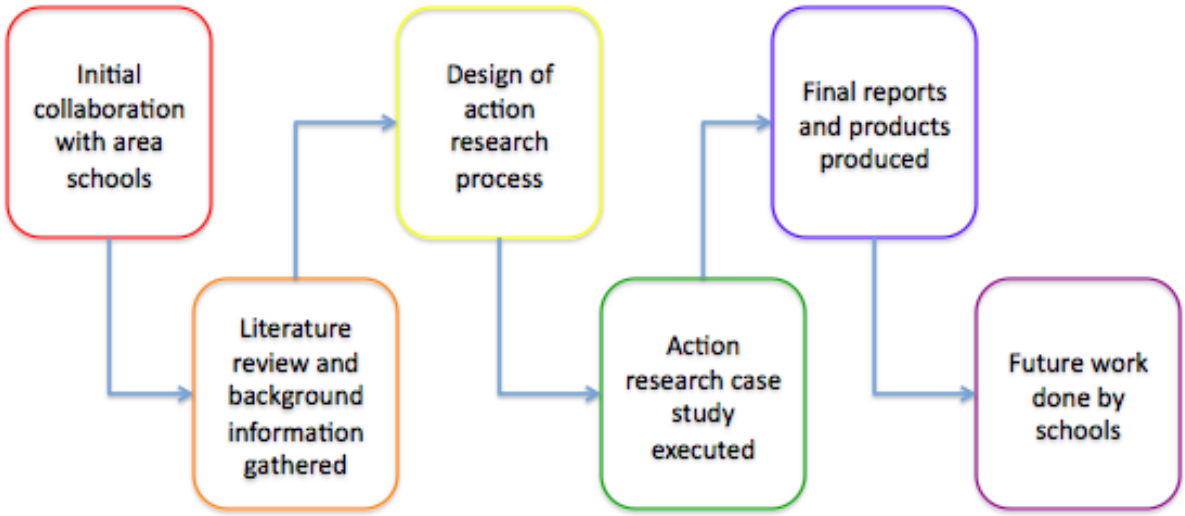

Figure 4: Overall research progression

The dissertation is shaped by the toolsets as they provide methods with which to experiment, and in turn shapes the fields from which these toolsets emerge by providing an opportunity for synergy and experimentation. The combination of these techniques is singular, and provides insight from which future studies and stakeholder initiatives can pull.

Chapter 3: School-Community Relationships and Sustainability

Schools and school-community relationships can provide insight for sustainable development. This chapter explores and highlights the particular strengths schools have for engaging in sustainability problem-solving endeavors. This is the launching point from which the case study portion of this dissertation began its investigation of full utilization of these capacities, as discussed fully in Chapters 5 and 6.

3.1 Schools and Their Communities

The American educational system reaches 95% of American children through public, private, or parochial schools (Gallup, 2011). In the fall of 2011, 19.7 million students attended American colleges and universities (NCED, 2011). Expanding outward from students, we see that schools also reach many other members of their communities: they are major employers and economic forces; as a physical space they influence the aesthetic character of their community and also impact local housing markets; and they are a wellspring of local resources like state and federal funding, land and recreational space, and political goodwill (Chung, 2005).

3.1.1 Community school movement. The inherent embeddedness of schools within their communities, through physical proximity and social ties, has resulted in efforts to utilize these school-community relationships to foster community development. One such effort, the community school movement, has recognized that a school and its community are coupled and have used this knowledge to maximize benefits for both parties (Blank, Melaville, & Shah, 2003). The Coalition for Community Schools says that a community school is both a place and a set of partnerships between school and community resources (Center for Mental Health in Schools at UCLA, 2011). As centers of their communities, they are intended to be available to all

community members at all hours of the day and all days of the week. When meeting student needs, they coordinate the assets of both the school and community. They also provide a range of services and opportunities to children, families, and communities by integrating academics, health, social services, youth and community development, and early learning and care. The goals of these "community schools" include improved learning, stronger families, healthier communities, collaborative governance, and social justice (Center for Mental Health in Schools at UCLA, 2011).

3.1.2 School-community interactions. In order to build organized action plans that address school-community engagement, it is useful to divide types of activities into separate categories. Schools interact with their communities through activities in three major categories: outreach, education, and infrastructure (MacKinnon, 2001; Sanders, 2001). Outreach activities include any events the school hosts, letters and other information distributed into the community, and access to classes, lectures, or facilities that the school provides the community. Educational activities are direct learning experiences provided for students, faculty, staff, and community members. This is not limited to what students learn in the classroom, but also includes knowledge that is internalized by the faculty and staff of the school and knowledge that students, faculty, and staff share with their friends and families. Infrastructural changes are activities that make the infrastructure and built environment of the school more sustainable. This includes visual changes at the school that the community gets to see and be inspired by. School gardens, solar panels, and water efficient landscaping are examples of this. Each of these categories can be visualized as a "change gateway," through which schools and their communities interact, as in the figure depicted below.

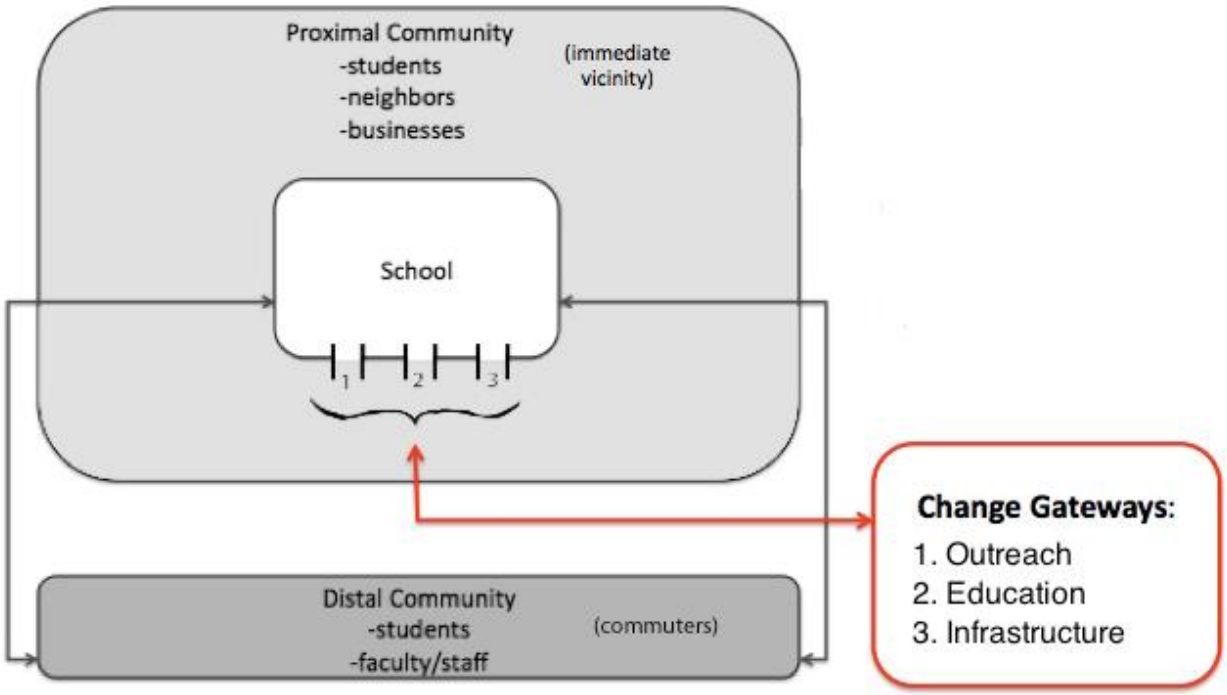

Figure 5: School-community change framework[1].

When this figure is coupled with the simplified social behavior and change model from Figure 1, schools can map what needs to change (knowledge, values, environment), with opportunities for action (outreach, education, infrastructure). From this understanding, an analysis of current sustainability education initiatives will provide a snapshot of how these opportunities for change are currently being utilized.

3.2 School- Community Engagement: Case Studies

There are a handful of schools that are currently engaging with their community in order to promote synergy and mutual benefits. One excellent example is Noble High School in North

[1] The proximal community includes the residents, students, and businesses that are close to the school physically. The distal community includes the students, faculty, and staff who commute to the school from further away.

Berwick, Maine, one of only about a thousand in the United States belonging to the Coalition of Essential Schools, which focuses on project-oriented learning (Bingler, Quinn, & Sullivan, 2003). When it was time to renovate the facility, the school district aggressively pursued community participation by holding forums, sending out surveys and questionnaires, and encouraging feedback from their students. The outcome was a school that was truly functional for both students and community members. They have equal access to the large library, media center, audio-visual center, television studio, editing room, two gymnasiums, fitness center, and 1,000-seat theatre. Students can enroll in a two-year culinary arts program that tests their skills by cooking for patrons dining at the "Round Table," a 50-seat restaurant with a separate entrance that is open to the community during school hours. On site at the school, also with separate entrances, are an adult education center, an all-day childcare center, and a community medical clinic (Bingler et al., 2003). This school and its community have achieved the community school ideal: both parties are benefiting from their relationship and the school is integrated rather than isolated from its surroundings.

Another excellent example of school-community engagement for change comes from Whittier Elementary, whose students engaged in the Chicago River Project (Bouillion & Gomez, 2001). The students selected a real world problem their community was facing and attempted to solve it through collaboration with their community. The students reached out to local organizations in Chicago to build partnerships for their work, and the teachers at Whittier Elementary incorporate these processes into the curriculum and standards. The partnership fostered by the school and community eventually included parents, a river stewardship committee, and an after-school project. The students and their partners performed a community

survey, completed water testing, created beautification plans, wrote letters to local politicians, and cleaned up a corridor of the Chicago River for community benefit. Their process allowed for the community to benefit from the students' learning process, and the students benefitted from engaging their community as a large interactive classroom (Bouillion & Gomez, 2001).

A final example comes from the Metropolitan Regional Career and Technical Center in Providence, Rhode Island. At this exemplary school, students attend regular courses for three of each five school days. The other two days are spent learning in their community, at hospitals, government offices, restaurants, and business (Bingler et al., 2003). Each student is provided curriculum to maximize these real-world learning experiences, and the community partners receive the help of the students during these apprenticeships.

These examples illustrate that school-community collaboration can lead to excellent outcomes for both the schools and the community in which they are embedded. However, the community school movement has been up to this point focused on community development in general, rather than on sustainable development.

3.3 School – Community Change for Sustainability: Where Are We Now?

Sustainability education programs, both formal and informal, are on the rise across the nation and globe. Check any Internet search engine using phrases like "sustainability education," "environmental education," "green education," or "eco education" and the sheer number and diversity of results is astounding. However, because sustainability education is a relatively new field, there are very few available sources from which schools can select standards. This has created a situation in which there is great diversity and range for what falls under the umbrella of

sustainability education, especially for K-12 schools. This is especially true because these schools are generally adding sustainability education onto their current state-mandated curriculum as something extra, or almost as an elective, rather than as an integral or integrated piece.

3.3.1 U.S. Department of Education Green Ribbon Schools. To get an idea of the sort of efforts that are currently being utilized in schools that are "exemplary" in this field, the U.S. Department of Education Green Ribbon Schools program can provide a data set for analysis. The program honors K-12 schools in the United States that are exemplary in, "reducing environmental impact and costs, improving the health and wellness of students and staff, and providing effective environmental and sustainability education" (U.S. Department of Education, 2012). Eighty schools were given the award in 2012, and their diverse efforts ranged from the installation of solar panels all the way through master gardening programs. A qualitative assessment of the Green Ribbons Schools examined each school's efforts through the lens of the school-community change framework. Each school was awarded a point for each of three change gateways (outreach, education, and infrastructure) if they met the following criteria:

1. Outreach- A school earned a point for outreach if the school made efforts to put on events for community, or directly share information about sustainability with their community through events for literature dissemination. Schools that partnered with larger organizations, like the U.S. Forest Service, as a form of community outreach, were not given a point for outreach since these larger organizations were less likely to include

community members that were directly a part of the proximal or distal school community as defined in the school-community change model.

2. Education- A school earned a point for education if the school's sustainability curriculum permeated throughout the school and to multiple grade levels. This rationale was used because studies show that students retain learning better if they are presented with material repeatedly, and not from single-event learning opportunities (Saville, 2011). Additionally, curriculum changes that were based solely on environmental and ecological science were not awarded a point for sustainability education. The rationale for this delineation is the fact that sustainability science is much more complex and nuanced that a simple study of ecosystems or other natural systems. This information is certainly relevant for sustainability, but cannot be equated with sustainability if we are to avoid an endorsement of "weak sustainability" (Du Pisani, 2006; Gutés, 1996).
3. Infrastructure- A school earned a point for infrastructure if the school made changes to improve any aspect of infrastructural sustainability, including improvements in energy consumption, renewable energy generation, landscaping and school garden construction, and so an. Additionally, schools earned a point for infrastructure if they made significant changes in the practices and systems in which the students and other community members were embedded. This included fostering changes in behavior, such as the utilization of "walking school buses" or through the utilization of local and sustainable produce in the school cafeteria (Sayers, LeMaster, Thomas, Petroski, & Ge, 2012).

The analysis of the U.S. Department of Education Green Ribbon Schools program revealed some interesting insights into the sort of changes that schools are incorporating in order

to make themselves more sustainable. As portrayed in the figure below, 91.25% of the schools made infrastructural changes to their schools in order to comply with the green ribbon standards. In stark contrast, only 32.5% of the green ribbon schools incorporated sustainability concepts into their curriculum, and only 13.75% utilized outreach as part of their sustainability efforts.

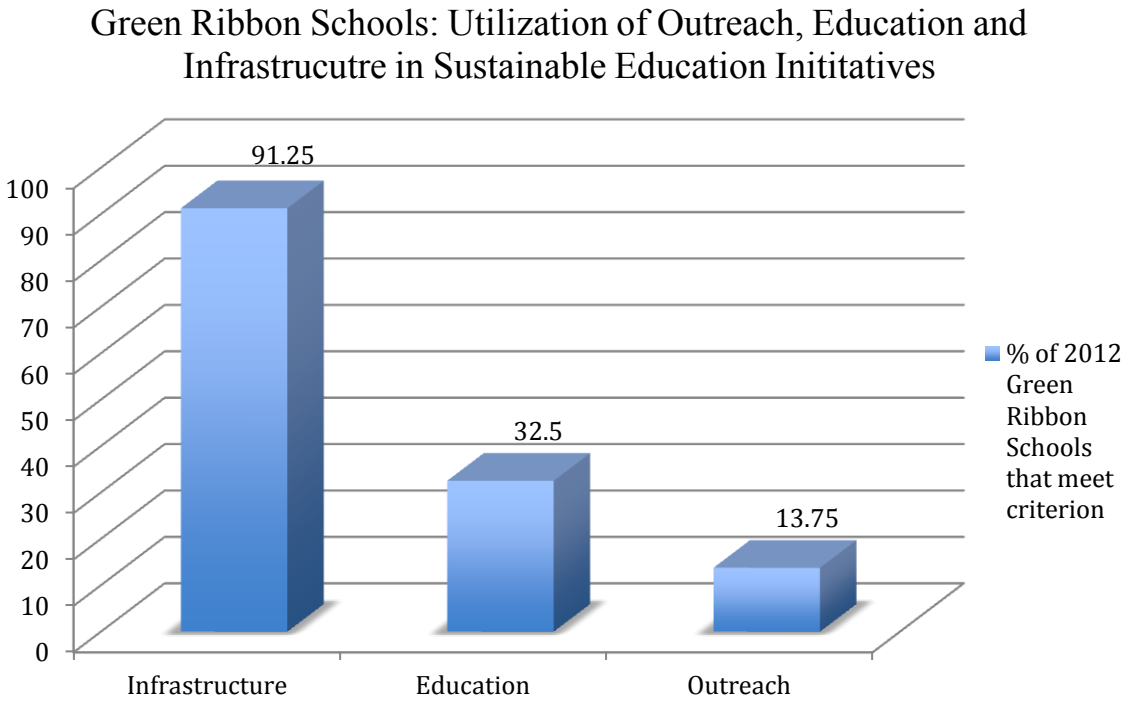

Figure 6: Analysis of 2012 U.S. Department of Education Green Ribbon Schools (Tabulated by author based on data presented in U.S. Department of Education, 2012)

In other words, schools are disproportionally qualifying as "green schools" by changing the infrastructure in which their community operates, rather than by utilizing the opportunity to change their curriculum or outreach practices. One explanation for this is the fact that infrastructural changes are much less time-intensive than changes in educational or outreach practices, since many infrastructural projects are essentially one-time occurrences. On the other

hand, changes in educational content and outreach practices require ongoing effort as well as the commitment of personnel to incorporate these changes.

This hints at one of the most significant challenges faced by K-12 schools. Any efforts that are not directly tied into achieving higher student test scores on standardized tests is generally pushed to the backburner, relegated to be addressed when time permits, or not at all. Unfortunately this has had negative effects on a wide range of student activities, from music to P.E. to alternative education topics like sustainability (Travis, 2010).

Chapter 4: Childhood Obesity and Sustainability

Sustainability problems are complex, systemic, and have serious repercussions for future generations as well as our own (B. R. W. Kates et al., 2005; United Nations, 2008). This chapter provides an in-depth analysis of why childhood obesity qualifies as a sustainability problem. The childhood obesity epidemic has especially grave implications for the sustainability principles that reference our social systems. The systems of social discrimination and inequity that have contributed to the widening gap between rich and poor are also magnifying the incidence of childhood obesity for marginalized communities (Crouch, 2011; Flynn et al., 2006; Jackson & Sinclair, 2012; Potvin, Cargo, McComber, Delormier, & Macaulay, 2003). And though the connections are less direct, childhood obesity is also tightly coupled with unsustainable agricultural practices, which have wide implications for resource use and ecological degradation (J. Foster, 2011; Hinman, 2011).

4.1 Childhood Obesity vs. Gibson's principles

Robert Gibson's core criteria for sustainability assessments, covered in detail in Chapter 2, can be used to evaluate childhood obesity as a sustainability problem. This is achieved through an examination of the elements of the childhood obesity problem that are in direct conflict with each of Gibson's criteria (Crouch, 2011; J. Foster, 2011; Jackson & Sinclair, 2012; Mead, 2008).

4.1.1 Livelihood sufficiency and opportunity vs. childhood obesity. This criterion ensures that people have the key provisions for a decent life, including physical and economic security. The childhood obesity system map reveals that because unhealthy foods are less expensive and more accessible than healthy foods, there is now a situation where parents and

schools must make the choice between expense and health when feeding children (Anderson & Butcher, 2006; J. Foster, 2011; Jackson & Sinclair, 2012). This makes childhood obesity a violation of people's ability to provide for a decent (healthy) life.

4.1.2 Socio-ecological system integrity vs. childhood obesity. This criterion ensures that the long-term integrity of the ecological environment, upon which all earth's biological and social systems depend, is maintained. Because environmentally damaging agricultural practices are used to produce the excessive quantities of U.S. Farm Bill subsidized commodity crops that are made into unhealthy foods like corn syrup, there is a link between childhood obesity and environmental degradation (J. Foster, 2011).

4.1.3 Intragenerational equity vs. childhood obesity. This criterion ensures that sustainable livelihoods are available for everyone, and aims to reduce the gap between the rich and poor. Obesity rates for ethnic minority children in the Unites States exceed the rates for white children by 10 to 12 percentage points (Kumanyika & Grier, 2006). Because childhood obesity is more prevalent in low-income communities where food deserts and unsafe conditions are more prevalent, it actually serves to widen rather than eliminate the gap between rich and poor by adding health problems to the list of challenges faced by those already struggling to get by (Crouch, 2011; Flynn et al., 2006; Jackson & Sinclair, 2012; Kumanyika & Grier, 2006; Potvin et al., 2003). This is a clear indicator that childhood obesity is a barrier to achieving intragenerational equity.

4.1.4 Intergenerational equity vs. childhood obesity. This criterion aims to ensure that we favor actions that are most likely to preserve or enhance the opportunities and capabilities of future generations to live sustainably. Children who suffer from childhood obesity grow up to be

adults with significantly higher rates of diabetes, cardiovascular disease, and other health problems; making them the first generation with a lower life expectancy than their parents (Dietz, 1998; Flynn et al., 2006; D. S. Freedman et al., 2001; David S Freedman et al., 2005). A future filled with adults who suffer from all of the negative health effects associated with obesity is a future of diminished potential (Dietz, 1998; Flynn et al., 2006; D. S. Freedman et al., 2001; David S Freedman et al., 2005). For these reasons, childhood obesity is also in clear violation of intergenerational equity.

4.1.5 Resource maintenance and efficiency vs. childhood obesity. This criterion aims to ensure sustainable and efficient use of natural and energy resources. Because excessive quantities of fossil fuels are used as pesticides and fertilizers and to transport U.S. Farm Bill subsidized commodity crops that are made into unhealthy foods like corn syrup, there is a link between fossil fuel consumption and childhood obesity (J. Foster, 2011). Additionally, obesity health care costs are dramatically on the rise, with recent estimates indicating that 10% of health care spending is being funneled into obesity and its correlated illnesses (Hammond & Levine, 2010). The funneling of so much capital into preventable problems is also a clear case of resource inefficiency.

4.1.6 Socio-ecological civility and democratic governance vs. childhood obesity. This criterion seeks to build the capacity, motivation and inclination of individuals, communities and other stakeholder groups to contribute to democratic decision-making. Many of the upstream factors that lead to childhood obesity, such as legislation like the U.S. Farm Bill, community designs that lack bike lanes and sidewalks, food deserts and discriminatory zoning, and school lunch programs that are filled with unhealthy foods are established without the participation of

the stakeholders most affected by them (Crouch, 2011; J. Foster, 2011; Jackson & Sinclair, 2012; Mead, 2008). Therefore, many upstream drivers of childhood obesity exhibit clear violations of democratic governance, and are leading away from rather than toward socio-ecological civility. Additionally, there is a strong correlation between increased education and increased participation in democratic ventures (Glaeser, Ponzetto, & Shleifer, 2007). This speaks to the need for increased education on the systemic problems that lead to childhood obesity in order to foster democratic participation in the process of solving it.

4.1.7 Precaution and adaptation vs. childhood obesity. This criterion requests that we acknowledge uncertainty and avoid unnecessary risks; embrace flexible design in anticipation for surprises. Unfortunately, maintaining the current trajectory of childhood obesity would clearly be an unnecessary risk for the sustainability of our future. This calls for precaution and flexibility as we explore solutions (Brennan, Castro, Brownson, Claus, & Orleans, 2011; Flynn et al., 2006).

4.1.8 Immediate and long term integration vs. childhood obesity. This criterion is a reminder to apply all of these principles of sustainability at once, because what happens in one part of a system also has an effect on the others. The components of our system that have lead to the childhood obesity epidemic demonstrate failures across all sustainability criteria, and therefore also fail to implement them in an integrated fashion (Farley, 2007; Gibson, 2006)

4.2 Current school-based childhood obesity mitigation strategies by problem

Current school-based programs that attempt to address childhood obesity typically attempt to remedy several main perceived challenges. Brief descriptions of these main

challenges, along with several of the school-based programs that attempt to address them are as follows.

4.2.1 Kids don't walk or bike to school. In the 1970s, 66% of children walked or rode a bicycle to school. By 2000, only 13% did, and the number continues to drop (Beaumont & Pianca, 2000; Jackson & Sinclair, 2012). Initiatives like Safe Routes to School, and the Active School Neighborhood Checklist use education, engineering, and enforcement strategies to help make routes safer for children to walk and bike to school (Fellows, 2010; Pedestrian and Bicycle Information Center, 2007). These strategies include adding bicycle lanes, improving sidewalks, adding pedestrian signals to traffic lights, decreasing speed limits on streets and adding pedestrian paths through cul-de-sacs and dead ends. Some schools are also organizing "walking school buses," where groups of parents and kids all walk to school together, stopping and picking children up along the way like a regular school bus does (Brennan et al., 2011). One barrier identified by many parents is the distance they live from school (Pedestrian and Bicycle Information Center, 2007). This problem has increased ever since the 1970s, when policies began to favor large regional schools over small neighborhood schools (Beaumont & Pianca, 2000; Jackson & Sinclair, 2012).

4.2.2 School policies detract from wellness. In 1946, Congress passed the National School Lunch Act, which guaranteed a free or subsidized midday meal for millions of needy children (Hinman, 2011). Unfortunately, as school budgets became smaller and the federal oversight of the program became entrenched in bureaucracy, the quality of these meals dropped lower and lower (during the Reagan administration they even attempted to reclassify ketchup as a vegetable in order to save money) (Hinman, 2011). In response to this, as of 2006 all schools

participating in school lunch programs have been asked to develop official School Wellness Policies (Schwartz et al., 2012). The requirements of these policies include: goals for nutrition education and physical activity; nutrition guidelines for all food available at school during the day; an assurance that school meals follow federal law; a plan for measuring implementation of the policy; and the involvement of parents, students, the school food authority, school board, school administrators, and the public in the development of the policy (Schwartz et al., 2012). Research monitoring the effects of these initiatives reveal that the more specific, consistent, and comprehensive these policies are, the better their implementation and efficacy (Schwartz et al., 2012; Taber, Chriqui, Perna, Powell, & Chaloupka, 2012).

4.2.3 Kids do not get enough active play time. As school budgets dwindle gym classes and after school activities, like sports programs, are put on the chopping block (Travis, 2010). A large number of childhood obesity mitigation programs have focused in on bringing these programs back, and in integrating physical movement into other school activities (Flynn et al., 2006). Michelle Obama's "Let's Move!" campaign has zeroed in on schools as a key setting for kids to get their "sixty minutes of play," especially through maintenance of strong physical education programs (Hinman, 2011).

4.2.4. Kids are not taught about nutrition. As more schools focus in on "teaching to the test," subjects like nutrition, the fine arts, and gym classes are abandoned (Travis, 2010). The revitalization of nutrition and active lifestyle curriculum is a prominent strategy in the childhood obesity mitigation movement (Brennan et al., 2011; Flynn et al., 2006; Potvin et al., 2003). In some cases, this also includes the creation and utilization of educational school gardens, similar to those promoted by Alice Waters in the Berkeley area (Hinman, 2011; Jackson & Sinclair,

2012). Another strategy is to expose kids to fruits and vegetables through Farm to School programs and "fruit and vegetable grants" that teach children about different fruits and vegetables and how to prepare them (Brennan et al., 2011; Izumi, Alaimo, & Hamm, 2010).

4.3 Childhood obesity social change problem map

The problems discussed in the previous section are all pieces of a larger system that in sum contribute to the obesity epidemic. The following figure is one representation of this system through the lens of the social change (Ballard, 2005; Heath & Heath, 2010).

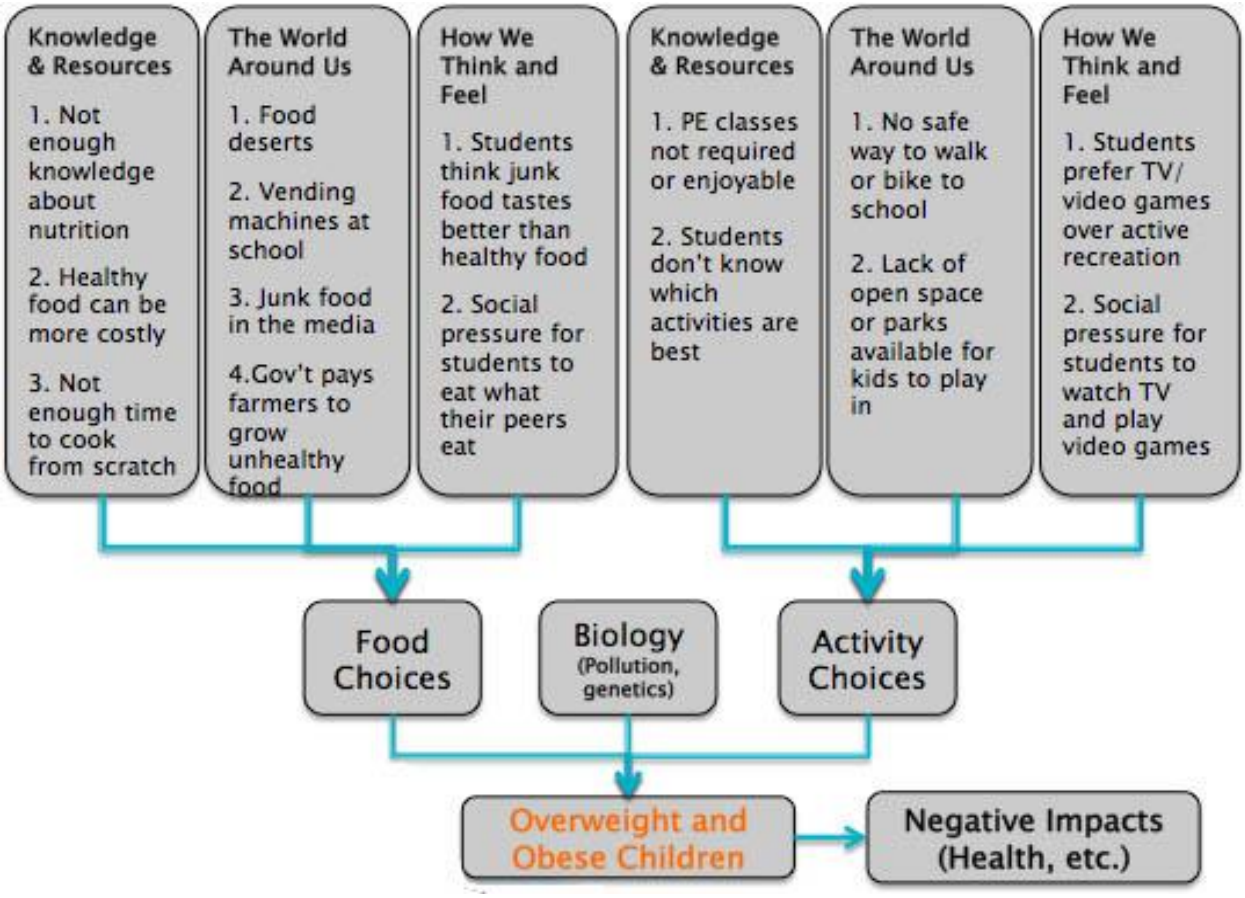

Figure 7: Social change system map of factors leading to childhood obesity

There are two types of choice represented in the system map: food choices, and activity choices. Many obesity prevention strategies focus solely on adjusting these choices, by attempting to promote activities and health foods to children (Brennan et al., 2011). However, the social change model indicates that choices are dictated by knowledge, values, and environment.

4.3.1 How knowledge and resources influence food choice. Even for people with ready access to information dense sources like the Internet and scientific articles, the science behind healthy eating is often confusing and contradictory. This has lead to confusion among the American population, and along with an abundance of food marketing for nutrient-deficient junk foods, Americans are purchasing foods which may appear to be nutritious, but in fact, are leading to ill health effects (Finegood, Merth, & Rutter, 2009; Flynn et al., 2006). Parents make the primary decisions in the foods their children eat at home, and therefore this knowledge gap may lead to poor food choices. Nutrition education in schools therefore is most effective in older children who actually do make some of their own food choices, and in situations where the parents are involved in the education process (Gower, Moyer-Mileur, Wilkinson, Slater, & Jordan, 2010). In addition, because healthy foods tend to be more costly in terms of both time and money, lower income families may have more trouble providing healthy meals for their families.

4.3.2 How the world around us influences food choice. There is significant evidence to show that convenience influences our food choices heavily (Anderson & Butcher, 2006; Heath & Heath, 2010). Couple this with the fact that across the nation, including in the Phoenix Metropolitan Area, there is a prevalence of food deserts, or area where access to fresh healthy

foods is practically non-existent, and you have an environment that is extremely prohibitive to healthy eating (Crouch, 2011; Mead, 2008). Many schools are filled with "competitive foods," which are junk food items such as those in vending and soda machines that compete with the school provided lunches (Hoffman & Salerno, 2012; Taber et al., 2012). The USDA spends $220 million annually on nutrition education, which is dwarfed by the $30 billion the food industry spends each year on advertising, the majority of it on fast food, convenience foods, and foods that ought be eaten sparingly such as desserts and sodas (Hoffman & Salerno, 2012). On top of all of this, the U.S. Farm Bill subsidizes foods that lack nutritional density, such as corn syrup, making these foods the most inexpensive and therefore accessible to most Americans (J. Foster, 2011). All of these elements together form an environment in which the less healthy food choices are often the easier choice. Reshaping the environment to make healthy choices easier is an important strategy in the fight against childhood obesity.

4.3.3 How the way we think and feel influences food choice. Junk food is specifically designed to appeal to our pleasure senses (Moss, 2013). Additionally, food marketing has created a culture in which certain foods have social appeal, especially amongst adolescents. Our emotional connection to certain unhealthy foods, coupled with social pressures to conform to the eating habits of our peers has created a value system that is currently skewed toward unhealthy choices. Shifting our societal values so that healthy food choices are part of our cultural norms is therefore also an important component of the strategy to combat obesity.

4.3.4 How knowledge and resources influence physical activity choice. Physical education classes are only required for only a quarter of American teenagers (Hoffman & Salerno, 2012). Therefore the variety of physical activities to which young Americans are

exposed is shrinking, limiting their knowledge about activities they might enjoy or which might be beneficial for their health. As with nutrition knowledge, physical education in schools is most effective in older children who make their own physical activity choices and in situations where the parents are involved in the education process. An underlying understanding of physical activity and its benefits is one element that can lead to the mitigation of obesity in concert with other driving factors.

4.3.5 How the world around us influences physical activity choice. Not every neighborhood is saturated with sidewalks, bike lanes, and safe accessible parks (Beaumont & Pianca, 2000; Jackson & Sinclair, 2012). As mentioned earlier in this chapter, in the year 2000 only 13% of children biked or walked to school, and perceived safety factored highly into this trend. Because our environment tends to either encourage or discourage behaviors that are easy or difficult respectively, neighborhoods without bike lanes, sidewalks, or parks tend to discourage physical activity. Therefore strategies that make physical activity a convenient part of everyday routine are another important piece of the obesity mitigation puzzle.

4.3.6 How the way we think and feel influences physical activity choice. The final driver to physical activity choices is our values surrounding physical activity. As with food advertising and cultural values, there are cultural norms that influence adolescent activity behaviors, especially with regards to TV and video game culture. A 2010 study by the Kaiser Family Foundation found that on average, 8-18 year olds in the United States are spending 7.5 hours per day using media such as TV, video games, Internet, and social media (Rideout, Foehr, & Roberts, 2010). Because the cultural norm for these youth is to commit nearly a full workday to these sedentary activities, it is difficult to conceive of a way for adolescents to manage to fit in

enough physical activity as well. Shifting the culture back toward an emphasis on time spent on active play and away from screens is an enormous but important challenge for composing strategies that mitigate childhood obesity.

In summary, it is essential for obesity mitigation strategies to look at the childhood obesity problem holistically, rather than focusing solely on negative actions and outcomes. It is crucial that it is understood that the combination of all of these factors has lead to the problem as it functions today, and only through addressing these influences in concert will we eventually see positive change.

Chapter 5: Case Study Introduction and Methods

As discussed previously, there are many schools that have expressed a strong desire to improve their community relationships, such as those claimed under the Community Schools Coalition (Blank et al., 2003). Additionally, there are many schools who have claimed a strong commitment to sustainability, such as those receiving Green Ribbon Awards from the U.S. Department of Education (Suarez Falken, 2012). The case study portion of this dissertation explores the potential intersection of these efforts, through the lens of two schools in the Phoenix Metropolitan Area, and this chapter provides an overview of the goals and objectives of the case study research undertaken during this dissertation, along with the research methods utilized.

5.1 Case study goals and objectives

A case study approach was selected for the research component of this dissertation for three main reasons. Firstly, the overall aim of this dissertation is to explore the role schools play in moving their communities toward sustainability. Because of my prior personal engagement with actual schools, there was real potential to answer this question while also providing mutual benefit for the schools with which I collaborated. Secondly, this case study, through utilization of action research methods (discussed in further detail below), allowed for shared ownership of the research results (Brydon-Miller et al., 2003). This speaks to the normative component of sustainability science, because it builds equity by distributing power evenly between the researcher and the stakeholders. Lastly, the case study approach is appropriate for sustainability science in general because it links knowledge with action. The field of sustainability exists to

solve sustainability problems, and case study research provides test sites for experimenting with these methods so that they can eventually be widely utilized.

As to this specific case study, the most comprehensive overarching goal was to examine the role of schools in solving sustainability problems, specifically through the lens of their relationship with their community. There were also several smaller goals. The first of these was to foster community sustainability through addressing a sustainability problem that the schools had a shared interest in attempting to solve. The second was to facilitate the creation of intervention strategies and strategy plans for solving this sustainability problem for each individual school, using sustainability problem solving methods. The final smaller goal was the provision of space for schools to collaborate on the common carriers and barriers that they experienced while attempting to work on their sustainability problem, providing them with opportunities to learn from one another and to also provide insight to inform future schools attempting these methods.

5.2 Action research methods

During the process of method selection during the planning phase for the case study, the field of action research became a key area of interest. Because the goals of the case study would result in long-term plans for the involved schools, it was essential to ensure that the work would carry on long after this dissertation was finished. Hence, the selection of action research, which aims to empower participants and to transfer the research capacity from researcher outward. This section provides an overview of the action research methodology, and provides justification for its use during the case study research.

5.2.1 Action research in practice. Action research produces actionable results for researchers and stakeholders. One excellent example relevant to the field of sustainability, facilitated bottom-up sustainability planning and development in one of the most socio-economically disadvantaged areas of Hungary (Bodorkos & Pataki, 2009). The process engaged Hungarians who were normally left out of the planning process, allowing them to seek common goals and actions for local development. As a result of the collaboration between the researchers and stakeholders, the region created and implemented a local products festival, along with a micro-region community development workers' association. The festival brings together producers of local products to celebrate themselves, their settlements and the micro-region at large (Bodorkos & Pataki, 2009).

Another example of action research in practice comes from an irrigation technology case study in Ecuador. The researchers brought together an action research team that included an indigenous irrigation organization, an intermediary NGO, and a university engineering center (Dewulf, Craps, Bouwen, Abril, & Zhingri, 2005). The irrigation software in the region was originally only developed by consulting irrigation experts, and not by working with actual end users. This action research study completely transformed the irrigation system software, allowing an end product that fully integrated the concerns of the citizens using the water and contributing to water use sustainability in the region (Dewulf et al., 2005).

5.2.2 Action research in this dissertation. As previously described, because action research produces actionable results and also fosters equity and capacity building, it was used to carry out the case study portion of this dissertation. The school stakeholders selected the sustainability problem that the research was to address, and their expertise was utilized in

crafting the action plans for future work on mitigating childhood obesity. Additionally, the schools formed their own research teams and executed surveys and other data collection activities on their own. This ensures that the work carried out over the two years this collaboration took place does not end when the dissertation is finished.

5.3 School Selection

The two Phoenix Metropolitan Area schools in this research were selected because they had already demonstrated a social commitment to community sustainability through previous participation in the Arizona State University GK-12 Science for Sustainable Schools program. This previous commitment to sustainability efforts suggested a stronger potential for success than could be anticipated in a school with no previous sustainability efforts. The schools' prior commitment to sustainability also demonstrates potential for forward momentum on the outcomes of the research process after involvement with ASU School of Sustainability has ceased. Additionally, the two schools were selected because they collectively covered all included grades (K-12). Both partnering schools grapple with similar challenges as those faced by schools nation-wide, including a high percentage of low-income students who are eligible for free or reduced lunch subsidies, and crippling budget cuts that have necessitated extreme creativity and dedication on the part of teachers to provide their students with more than simply a bare bones education (Travis, 2010).

5.3.1 School 1: Valley View Elementary School (K-8). Valley View Elementary School has distinguished itself as a standout educational institution in the Phoenix Metropolitan Area, despite the fact that they are located in one of the lowest socio-economic neighborhoods. The

school has embraced expeditionary learning as an educational model, allowing their students to develop depth in specific subject areas. The students learn by doing hands-on work, such as building bookcases and ramadas for the school. Additionally all students participate in regular organic school gardening, as well as animal husbandry with the campuses' chickens, goats, ducks, and geese. Composting sporadically occurs, but is not currently systematic, and the recycling system is well implemented.

5.3.2. School 2: Coronado High School (9-12). Coronado High School is the lowest income high school in the Scottsdale Unified School District. The staff and administration pride themselves on school sustainability, due to the school recycling program and the solar array on the school roof. This is somewhat in conflict with what the school's students experience though, because sustainability curriculum has not been integrated into many courses. Two teachers at Coronado have been working for the past several years to get a school garden established on campus for their science courses. They wish to use the garden for science and sustainability curriculum, and also wish to reach out to parents.

5.4 Case Study Methods - Overview

The case study protocol was created using resources from action research literature, transition management literature, and from sustainability problem solving literature. Additionally, several sustainability transition workshops conducted with researchers at ASU's School of Sustainability were referenced for the selection of workshop methods (Ozdemir, Guneysu, & Tekkaya, 2006; Wiek & Iwaniec, 2012). An overview of the case study progression is depicted in the figure below.

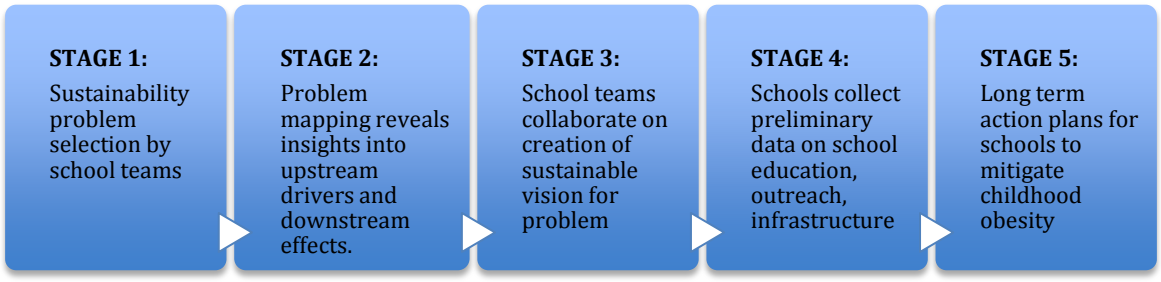

Figure 8: Overview of case study progression

5.4.1 Stage 1: Sustainability Problem Selection. Because participants in action research studies help to direct the research process, it was imperative that the case study school teams selected the sustainability problem that they wanted to address during the research process. Teachers and administrators from both schools participated in several initial conversations about pressing sustainability problems and the sustainability problem literature provided guidance in narrowing the options down to the following five sustainability problems faced by schools in the Phoenix Metropolitan Area (not in any particular order) (Wiek, Foley, & Guston, 2012).

1. Childhood obesity – A sustainability problem connected to food choices, availability of safe and suitable space for physical activity, and cultural factors important for sustainability (Anderson & Butcher, 2006).
2. Pollution/environmental quality – Air quality, trash and potentially hazardous dump sites, and environmental justice are a few components of environmental quality that are relevant to schools and their communities (Ross, 2011).

3. Energy inefficiency/ renewables - Making schools and their communities more energy efficient and moving away from fossil fuels and towards the use of renewable energy sources (Sachs & McArthur, 2005).
4. Consumption and waste - Production of trash, disposable vs. reusable items, utilization of recycling, composting (Seyfang & Smith, 2007).
5. Water consumption - Water efficient fixtures and practices, outdoor use: desert landscaping vs. grass and trees, neighborhood and community water use (Ross, 2011).

Teachers and administrators from both schools were given an anonymous online survey and were asked to rank each of these sustainability problems according to which was the most pressing. After the survey was administered, 88% of the respondents had identified childhood obesity as the sustainability problem that they felt was the most pressing. The next most highly ranked problems were "Pollution/environmental quality" and "Energy inefficiency/ renewables," which were tied for ranks two and three in the survey. "Consumption and waste" was ranked fourth out of the five sustainability problems listed, and "Water consumption" was ranked least pressing of the five options. Interviews with the survey participants revealed that childhood obesity was given precedence due to its swift progression and its very visible and immediate ramifications. It is much easier to push energy inefficiency out of your mind than it is to ignore the fact that your students are growing visibly sicker each passing school year.

5.4.2 Stage 2: Problem system mapping. Several teams of researchers at the Arizona State University School of Sustainability collaborated to create a problem system map of childhood obesity. This map was adapted to follow the knowledge, values, environment model

from the social-behavior change, and simplified to utilize language that was accessible to the school stakeholders.

5.4.3 Recruiting participants. The initial contacts for participation in the case study were the teachers and administrators who participated in the survey that identified childhood obesity as the selected sustainability problem. These individuals were asked to reach out to students and community members, so that there would be participants at all levels: student, community member, teacher, and administrator. For the vision workshop (described fully in the next section), fourteen stakeholders from the case study schools participated: six students, two community members, three teachers, and three administrators. The two community members represented two of the typical types of community members that a school engages with. The first was a parent, with children attending the school. The second was a neighbor, who lived in very close proximity to the school but lacked any other direct involvement. Their perspectives were critical to the case study, since school-community engagement and influence was one of the most important themes the research aimed to explore.

5.4.4 Stage 3: Vision workshop. The next step in the action research process was the development of a sustainable vision. The process of visioning is a phase in the transition management and intervention research process, one of the sustainability tools utilized by the case study and depicted below.

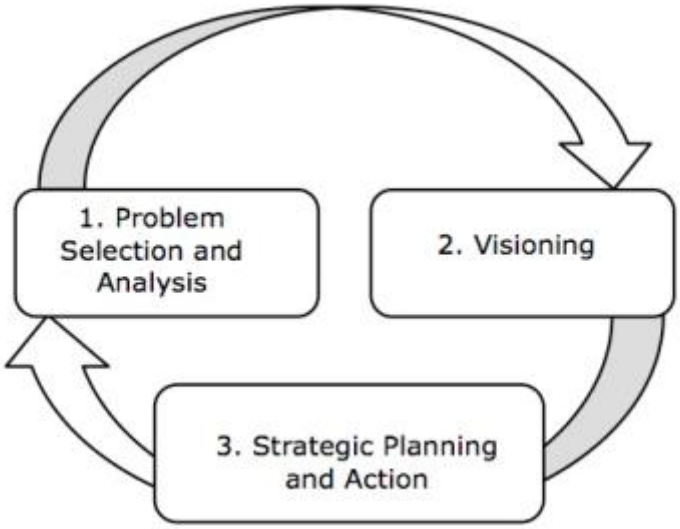

Figure 9: Transition management / intervention research process

Visions are important because they provide guidance for our future actions and create the goal that our strategies and actions aim for. In essence, it represents a community's hopes and dreams for the future (Park et al., 2009). The workshop protocol was created using literature on community visions, the principles of multiple intelligences, and the best practices from sustainability visioning workshops conducted at the ASU School of Sustainability. These allowed for the development of a workshop that was easy to understand, progressed clearly from one step to another, and engaged the participants with a variety of learning styles (Ozdemir, Guneysu, & Tekkaya, 2006). It was essential to create a vision workshop that was hands-on and participant-focused, so that the resulting vision truly reflected the priorities of the stakeholders, rather than those belonging to the ASU researcher. A simplified overview of the steps taken during the vision workshop process is depicted below in Figure 8.

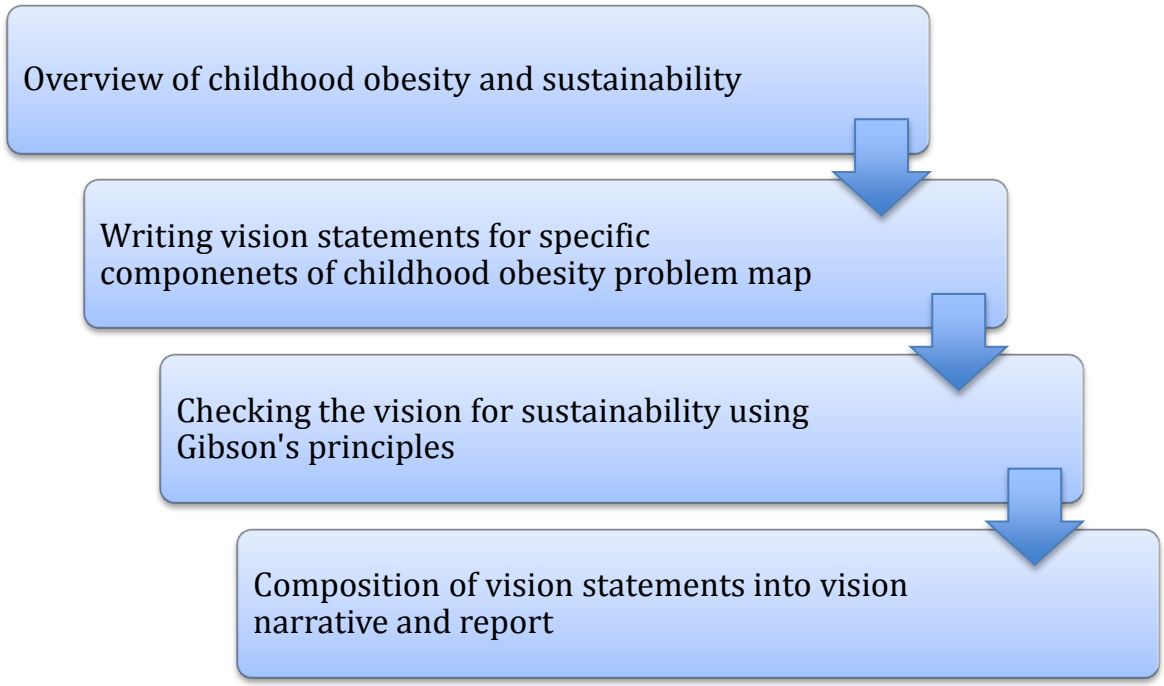

Figure 10: Simplified vision workshop steps

When the participants arrived they filled out an entrance survey (Appendix E), which served as a check on capacity building (Fetterman & Wandersman, 2007). This was especially important due to the fact that the majority of the participants had no formal experience with sustainability; therefore the entrance survey provided a baseline against which to measure future progress. The questions in the entrance survey utilized a Likert scale, which is commonly used to measure attitude (Jamieson, 2004). The participants then were given a short presentation that provided information about the previous work on childhood obesity that had been accomplished by the ASU School of Sustainability. The presentation also included the childhood obesity system/problem map from which the visions would be produced, depicted below.

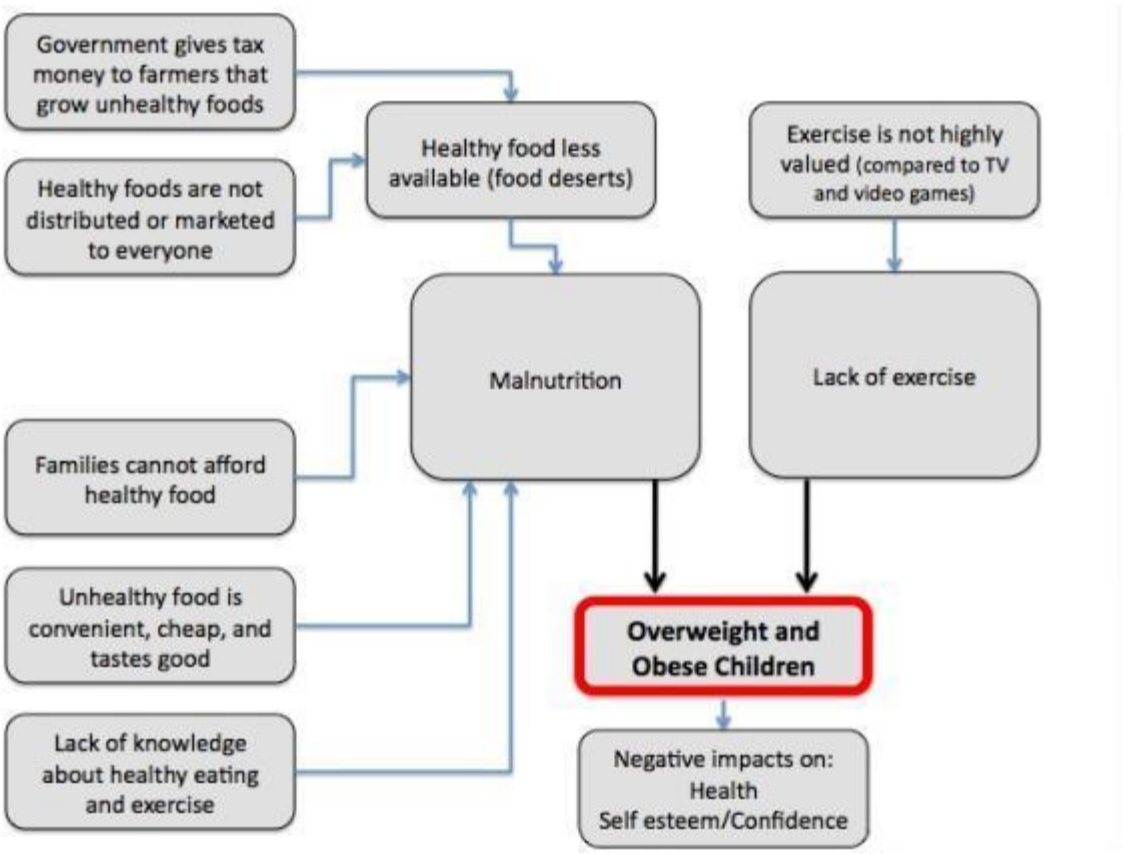

Figure 11: Simplified Obesity Problem Map

The childhood obesity system map allowed the participants to see how the system has worked to create the negative results we see in our schools today. From this overview, the actual visioning session began. Participants were reminded that a vision should be exciting and creative, and not limited to what we think is likely or possible. They were asked to imagine that they had traveled in time and were transported to 2030, where childhood obesity is solved. Participants wrote their vision statements with a marker on slips of paper individually. This helped to alleviate the issue of having a select few vocal participants dominate the conversation, and provides an opportunity to benefit intrapersonal learners (Ozdemir et al., 2006).

Participants then affixed their vision statement to the corresponding problem on the childhood obesity map. They then continued to add vision statements to the map until each problem had at least one correlated vision statement. By aligning the vision statements with various components of the childhood obesity system map, we ensured that the vision actually depicted a world in which each part of the problem is now solved.

The next step was the check for sustainability. The Gibson principles were utilized, because they focus in on the basic sustainability requirements that should inform a normative lens for sustainability assessment (Gibson, 2006). The first six of these principles have been relabeled with terms that are easier for a layperson to understand and will be used to label vision statements. The final two of the eight, "Precaution and adaptation" and "Immediate and long term integration" have been reserved for use during the strategy portion of the workshops, since they address the process of sustainability problem solving rather than the outcome.

The Gibson Principle labels used by the participants are depicted below.

Figure 12: Gibson Principle Labels

They used these labels to examine which of the principles were being met by various vision statements. The workshop participants then evaluated whether all of the Gibson principles had been fulfilled by the vision by counting how many times each principle was addressed on the map. Participants then added in any extra vision statements necessary to fulfill missing or poorly fulfilled Gibson principles.

The final activity on the problem map was to look for conflicts and tradeoffs. Participants looked at the vision map and discussed whether or not any of the statements were in conflict with one another. Checking for conflicts and tradeoffs is an essential component of the sustainability assessment process (Gibson, 2006). Without it, vision workshops can result in visions that are riddled with internal conflict, which only serves to cripple or destroy future efforts to achieve said vision.

At the end of the workshop, participants from each school examined a large printed map of their school and community. They then wrote a few sentences narrating their image, and imagined how the vision might play out for their school in particular. Engaging the right brain through storytelling and other creative activities allows for visual, verbal, and kinesthetic learning (Ozdemir et al., 2006). Additionally, this was an opportunity for the participants to transition toward imagining how the vision will play out for their specific school and community.

Before leaving, participants also completed a brief assessment of the vision workshop protocol, in order to ensure that it is adaptable other organizations like non-profits, schools, businesses, and even for future researchers at the ASU School of Sustainability. The results from

the vision workshop were analyzed and synthesized by the researcher and the vision document (revealed in the following chapter) was created and disseminated to the case study participants.

5.4.5 Stage 4: Preliminary Data Collection. The teachers and administrators worked from the shared vision toward individualized assessments of their school's current infrastructure, education, and outreach activities as they pertained to their vision for the mitigation of childhood obesity. The teachers at Coronado High School worked with the ASU researcher to create a survey that assessed student knowledge against the produced vision statements. This provided insight from which to anticipate necessary actions for the future. The participants at Valley View Elementary created a wellness committee, which met monthly to set goals and discuss progress. The finished reports and data from the case study research are revealed in the following chapter.

Chapter 6: Case Study Data and Products

This chapter provides a summary and overview of the data collected through the case study process, and the reports produced after data collection was finished. Included are all of the vision statements from the participants in the vision workshop, an overview of resultant vision report, the data collected by teachers at the case study schools, and an overview of the action plans produced for each school as they move forward with their childhood obesity mitigation work.

6.1 Vision Workshop

The vision workshop facilitated the collection of a set of vision statements, which were generalized and grouped and then used to build a vision narrative. The polished report (Appendix A[2]) organized the synthesized vision statements into school outreach, education, and infrastructure efforts, along with goals for advocacy.

6.1.1 Vision statements from workshop. The following tables list all of the vision statements produced by the vision workshop participants, organized by the section of the childhood obesity problem map to which they reference.

Table 1: Vision statements about food knowledge and resources

Vision Statements About Food Knowledge and Resources		
Children and adults will know the biology of human "cravings" and its relationship to modern availability/marketing of	Family units can describe how to be largely food self-reliant and practice some of what they know	Healthy yummy food in the cafeteria for students and staff, fresh fruit and veggies, vegetable options without Styrofoam and paper products

[2] Three K-12 schools participated in the vision workshop and gave input into the polished report. Only two of the original three schools went on to complete action plans for childhood obesity mitigation, due to personnel changes at the school.

salt/sugar/fat		
Awareness about obesity's severity and community get-togethers to prevent and eliminate it	Children are able to prepare healthy meals themselves and have enough knowledge to do so	Educational curriculum (PK-16+) is driven by "what matters."
School kitchens serve as a place for community cooking and meal prep and share	Kids work on local farms over weekends or break to learn about food production	Parents actively learning about nutrition and food prep
Cooking classes are offered at school so students can learn to cook healthy meals	Good nutrition becomes so common that school nutritionist positions are no longer needed	Kids have more time to make good and healthy choices when they eat by making a salad rather than eating chips

Table 2: Vision Statements About The World Around Us – Food

Vision Statements About The World Around Us – Food		
All gardening is organic with rotating seasonal crops. Healthy eating with the seasons	Accessibility to healthy, organic unprocessed foods in schools, at home and around Arizona	Urban agriculture is a viable business
Legislation so that school lunches are healthy	Junk food is limited/less available	Every community has a farmer's market
There are policies that favor affordable food	Ban on advertising of soft-drinks, high sugar cereals, etc	More public markets in the valley that are affordable, accessible, and who accept food stamps
Schools implementing and offering family cooking classes utilizing the fresh produce in their school gardens	The school grounds provide 75% of school lunch food to offset purchasing costs and as educational opportunity – excess is sold for program development	The farm bill is amended and now sponsors community gardens at schools for kids and families to grow food instead of receiving only food stamps

Table 3: Vision Statements About How We Think and Feel About Food

Vision Statements About How We Think and Feel About Food
Children and adults will know the biology of human "cravings" and its relationship to modern availability/marketing of salt/sugar/fat
Older "kids" had organized a social media revolution boycotting sugary soda
Kids think junk food is just for once in a while

Table 4: Vision Statements About Food Choices

Vision Statements About Food Choices
Over eating is reduced or eliminated
Children choosing to eat unhealthy snacks only on occasion

Table 5: Vision Statements About Activity Knowledge and Resources

Vision Statements About Physical Activity Knowledge and Resources
Neighbors complain because kids are outside at school so much due to expansion of physical education classes
The education curriculum starts with kindergartners focusing on their community and proceeds to 12 grade global studies

Table 6: Vision Statements About The World Around Us – Physical Activity

Vision Statements About The World Around Us – Physical Activity	
Schools are overburdened with bicycles and are forced to convert car parking to bicycle parking	Lots of open space and recreation options
Community sports programs engage 80% of kids in the community	Sports programs are supported by sports professionals/events
Have time/opportunity for physical fun built into the school day for students/staff/parents every day/every year	Schools partnering with community recreation centers to offer free or reduced family gym memberships and annual family fitness festivals

Table 7: Vision Statements About How We Think and Feel About Physical Activity

Vision Statements About How We Think and Feel About Physical Activity	
Children would rather play outside or move around than be sedentary	Motivation and inspiration to want to eat healthy, organic, unprocessed foods and be active, fun PE classes
Virtual community identity (kids play active video games)	"The norm" is being active, there is an established active culture

Table 8: Vision Statements About Physical Activity Choices

Vision Statements About Physical Activity Choices
Kids biking to and from school
Physical activity (all ages) has doubled and reliance on automobiles is halved
All kids are outside running and being active other than sitting on a couch staring at a screen just moving their thumbs
Children actively playing outdoors
Kids play "connect" with other schools on hot days or they do dance and athletics in virtual commons

Table 9: Vision Statements About Biology

Vision Statements About Biology
Food and water are made without chemicals
Water and food is free of contaminants

6.1.2 Vision narrative. The year is 2030 in the Phoenix Metropolitan Area and childhood obesity is gone. Families are knowledgeable about good nutrition and the science behind food cravings. There is widespread awareness about how to make healthy food choices. Every community has access to healthy, affordable, unprocessed organic food. It is now easier to find healthy food than junk food! This has been aided by an abundance of small-scale urban agriculture, like family and school gardens. Food legislation has evolved, and school lunches are now filled with healthy fruits and vegetables, served on real plates instead of Styrofoam. The

Farm Bill sponsors community gardens instead of just food stamps. There are no chemical contaminants in our food and water. Kids and their families take cooking classes at school that promote the use of all the available fresh produce. Overeating and unhealthy snacking have plummeted, and junk food is rarely consumed. The school curriculum starts with kindergartners to encourage healthy eating and an active lifestyle. Most kids walk or bike to school, filling up the bike racks! They get to be active every day at school, and schools offer sports programs that serve both the kids and their families. There is an abundance of open space and recreation programs, and schools have partnered with area recreation facilities to offer reduced gym memberships. Kids would rather play outside or be otherwise active than engage in sedentary activities like watching TV or playing video games.

6.1.3. Synthesized vision statements. The vision statements produced by the vision workshop participants were grouped into similar themes, and then synthesized down to generalized statements. These synthesized vision statements were organized into each of the defined action areas from **Error! Reference source not found.**

Table 10: Synthesized vision statements organized by school action area

School action area	Synthesized vision statements
Education	We teach our students and staff… 1. Which foods are healthy 2. Where to get healthy food 3. How to prepare healthy foods 4. Why we crave unhealthy food 5. How to be active 6. Where to be active
Infrastructure	Our school… 1. Is walkable and bikeable 2. Has indoor and outdoor recreational space

	3. Has a healthy school lunch program 4. Has a school garden
Outreach	We provide our community with… 1. Opportunities for fitness through sports leagues and partnerships with local fitness facilities 2. Classes and fairs about nutrition 3. The opportunity to get involved with our school garden
Advocacy	We will advocate for… 1. Better school lunch guidelines 2. Clean water, food, and air 3. Subsidies for vegetables and fruit 4. Funding for school gardens 5. Food access justice

6.1.4 Sustainability competency entrance survey. The entrance survey, taken by all workshop participants, provided a baseline against which to measure capacity building for sustainability competency. The participants were asked three questions, with these responses.

1. On a scale of 1-5, how well do you feel you understand sustainability? (Have you read about it, heard about on TV, working on it yourself, etc.?)

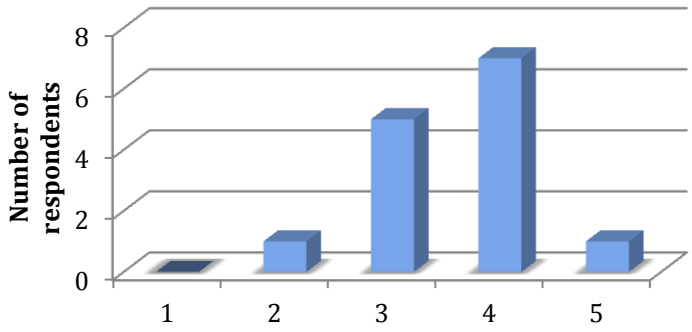

Figure 13: Vision workshop responses to Likert scale question about overall understanding of sustainability

2. On a scale of 1-5, how capable do you feel you are in working on sustainability problems? (How willing and comfortable do you feel? Do you have enough knowledge and information?)

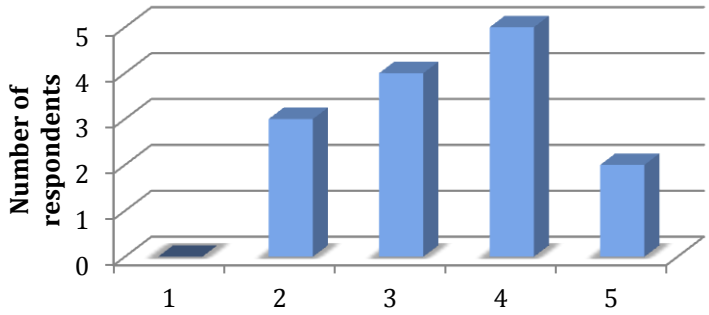

Figure 14: Vision workshop respondents' self-assessment of their sustainability problem solving capability (5 = most capable)

3. On a scale of 1-5, how embedded is your school in its community? (Are there strong community outreach programs? Do community members come to school events, and are many of the students from the surrounding community

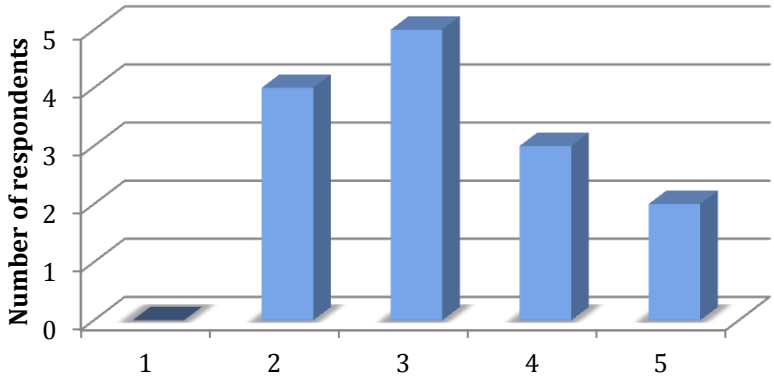

Figure 15: Vision workshop responses to Likert scale question about school-community embeddedness

6.2 Action plan and preliminary data from Coronado High School.

The teachers at Coronado High School who were leading their school's efforts to mitigate childhood obesity elected to survey their students in order to obtain baseline data that provided an indication of their school's progress toward the vision. This baseline data would eventually be used to build their action plan for a sustainable approach to solving childhood obesity through education, community outreach, and environmental change.

6.2.1 Coronado H.S. student survey data. The student survey (Appendix E) allowed the leadership at Coronado to get a picture of what their students knew about healthy lifestyle choices. The students were asked the following questions, and a summary of their responses is also provided.

1. In question one, the students were asked to correctly fill in a version of the Harvard Healthy Eating Plate (Yale Kamila, 2011). The comparison image was created by examining what the students selected for the largest portion on their plate.

Figure 16: Averaged student version of Harvard Healthy Eating Plate vs. actual Harvard Healthy Eating Plate

2. If you were told to go get yourself some healthy food, where would you go?

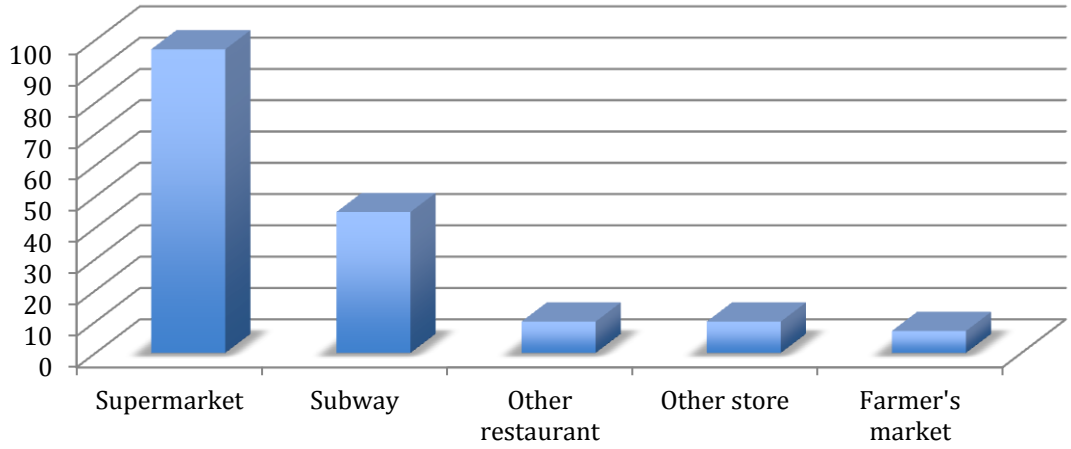

Figure 17: Student response to question about where they would go to get healthy food (open ended, write-in question)

3. Name one exercise that you know how to do:

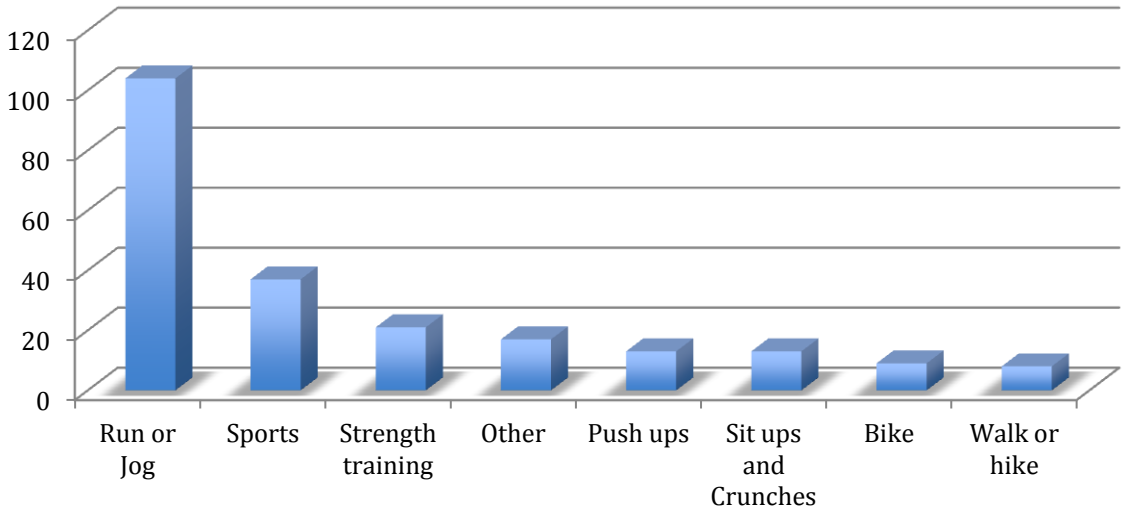

Figure 18: Student response to question about exercises they know how to do (open ended, write-in question)

4. Name one indoor place where you like to exercise:

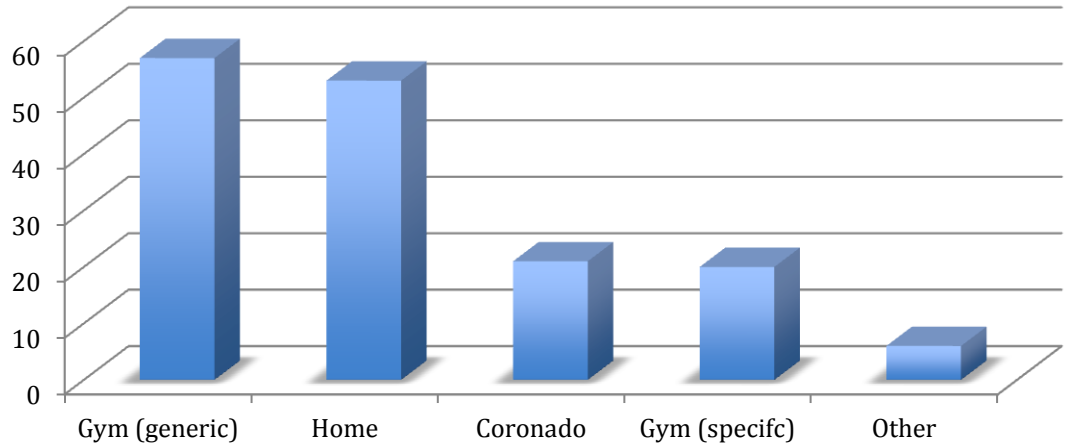

Figure 19: Student responses to indoor places they like to exercise (open ended, write-in question)

5. Name one outdoor place where you like to exercise:

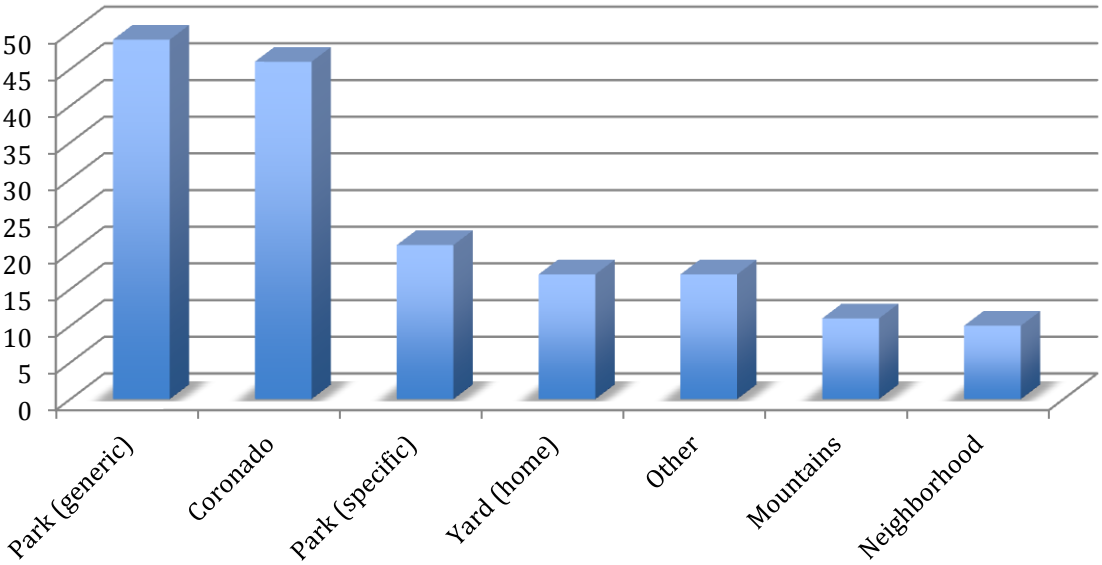

Figure 20: Student responses to outdoor places they like to exercise (open ended, write-in question)

6. Circle the number that best describes how comfortable you feel about cooking healthy food. (1 being least comfortable and 5 being most comfortable).

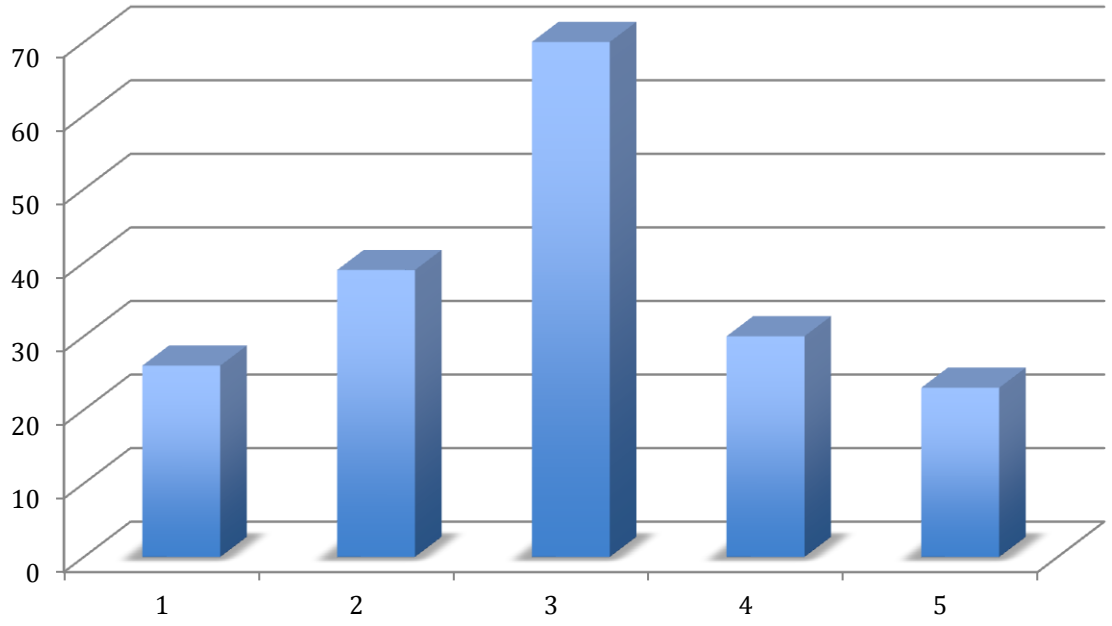

Figure 21: Student self assessments of comfort with healthy cooking

6.2.2 Coronado High School action plan. The Coronado H.S. teachers utilized the data collected from the student surveys, along with an assessment of school infrastructure and outreach endeavors in order to create their long-term action plan (Appendix B). A summary of the action plan is provided below (organized by vision statement).

1. *We teach our students and staff which foods are healthy.*
    - Student knowledge will be assessed by testing for comprehension of the "MyPlate" graphic produced by institutions like the USDA and the Harvard School of Public Health.

- Coronado will integrate MyPlate and other nutrition curriculum into Coronado H.S. physical education department classes as well as other Coronado H.S. courses. Additionally, placement of MyPlate displays will be placed in the cafeteria, and nutrition information will be sent home or e-mailed to families with other Coronado correspondence.

2. *We teach our students and staff where to get healthy food.*
    - Coronado students and staff will be periodically surveyed to ensure that they are aware of community opportunities for healthy food purchasing.
    - Coronado will integrate food shopping curriculum into life skills classes. Additionally, Coronado will spread information about local, healthy, and sustainable food purchasing opportunities to students and staff through newsletters, PSA's, or creative signs and posters.
3. *We teach our students and staff how to prepare healthy foods.*
    - Coronado will integrate healthy cooking curriculum into life skills classes. Additionally, hands- on cooking demonstrations will be given periodically to students, staff, and family/community members.
4. *We teach our students and staff how to be active.*
    - Coronado will develop a non-competitive running club for students and staff to build on their running skills and techniques, in response to the high popularity of running and jogging in the student survey of exercises they feel proficient in. Coronado will also continue to teach a variety of exercises through the Coronado P.E. department.

5. *We teach our students and staff where to be active.*
    - Many Coronado students identified Coronado as a place that they were likely to exercise, both indoor and outdoor.
    - Therefore, Coronado will offer after school opportunities for Coronado students and staff to use the track and other Coronado fitness facilities. Coronado will also offer information to students and staff about places in their community where there are opportunities to be active.
6. *Our school is walkable and bikeable.*
    - Coronado scored a 65 out of 100 on the website Walkscore, which rates walkability through metrics like average block length, intersection density, link/node ratio, and route directness. Therefore, Coronado will make initial inquiries into enrolling in the Safe Routes to School Program.
    - Coronado will also engage students and staff in challenges to bike or walk to school.
7. *Our school has indoor and outdoor recreational space.*
    - Coronado's outdoor fitness facilities include an outdoor track, football field, soccer field, eight tennis courts, and two backstops for baseball and softball. Indoor facilities include a weight training room, dance studio, and gymnasium. Because these facilities are adequate for physical fitness, only routine maintenance is required to achieve this vision.
8. *Our school has a healthy school lunch program.*

- Coronado will continue to work with the Scottsdale Unified School District on improvements in school lunch menu items. Additionally, Coronado will do periodic audits of student consumption behaviors, in order to assess whether or not healthy food choices are actually being selected and consumed.

9. *Our school has a school garden.*
    - Planned improvements to the school garden site include the construction of raised beds, adding signs to make the garden more visible and aesthetic, the construction of a compost pile, and the addition of shaded seating.
10. *We provide our community with opportunities to be active.*
    - Coronado will look into opportunities to open up recreational spaces to members of the community, such as through the hosting of recreational sports leagues or sports events that are open to all community members.
11. *We share information about nutrition and healthy living with our community.*
    - Coronado will include more information about healthy living in their community communications, like newsletters and public events.
12. *We allow community involvement in our school garden.*
    - Coronado will engage the community in garden work days to continue to improve the garden and to strengthen community ties.

6.3 Action plan and preliminary data from Valley View Elementary

The case study participants at Valley View Elementary elected to form a school wellness committee to tackle health challenges faced by their school, including childhood obesity. One of

the initiatives that the school decided to undertake was a health and wellness program, called "My Healthy World," for the seventh and eighth grade students. This program provided baseline data on student knowledge about healthy living. Additional data was provided by the Valley View physical education instructor, who tracked the BMIs and fitness achievements of his students.

6.3.1 Data samples from My Healthy World curriculum. The My Healthy World curriculum covers both healthy eating and active lifestyle. A sample of the types of questions students are asked and their responses are provided below.

1. During the past week, I ate five or more servings of fruits and vegetables:

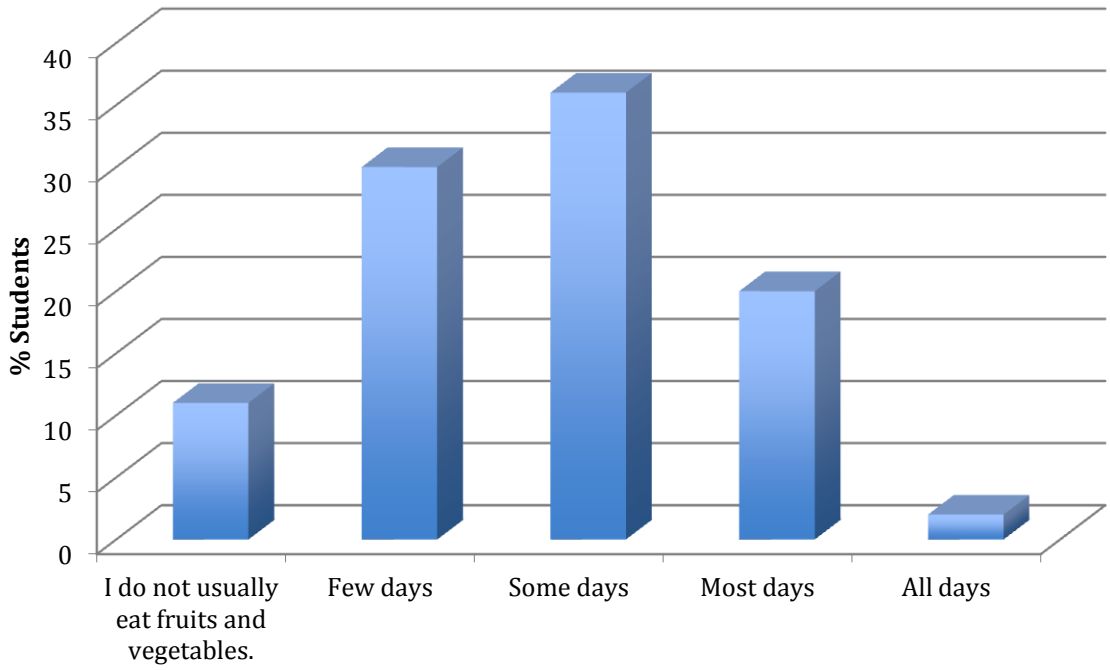

Figure 22: Student responses to assessment of fruit and vegetable consumption

2. I know how to make healthy food choices.

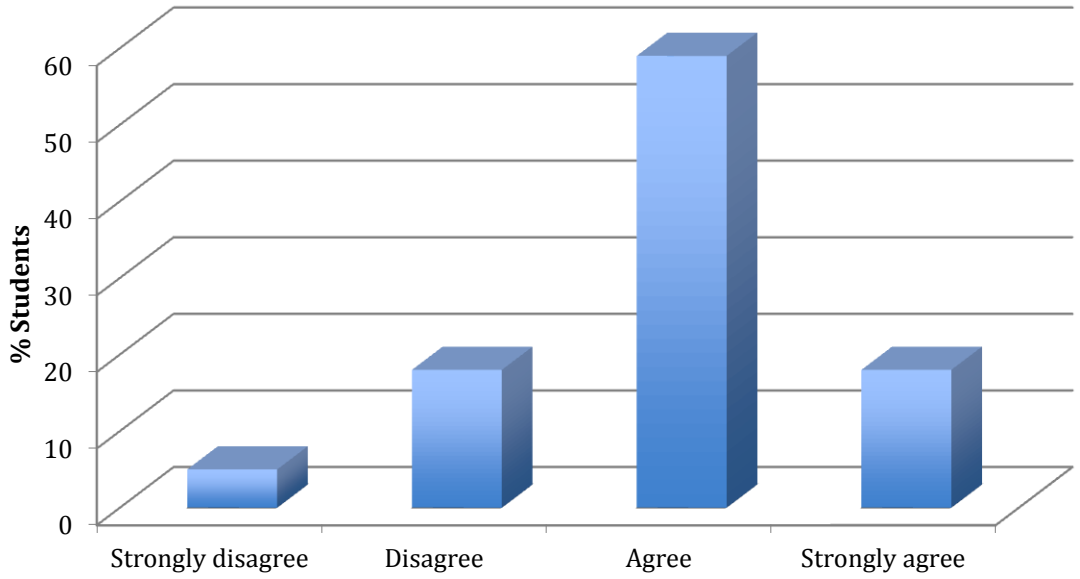

Figure 23: Student self-assessment of ability to make healthy food choices.

3. I understand how food affects my health.

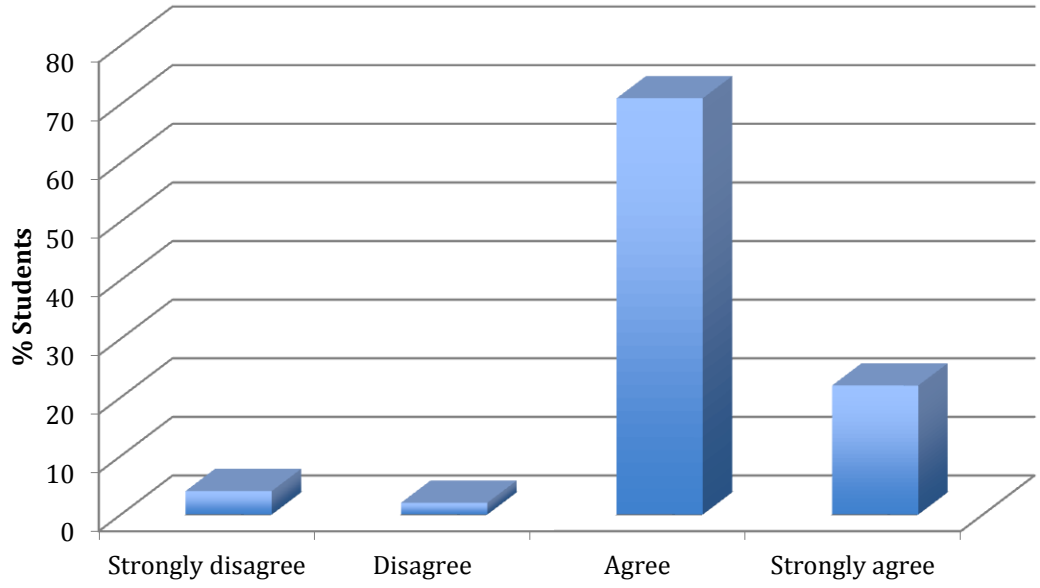

Figure 24: Student knowledge - link between food and health.

4. My family eats healthy food.

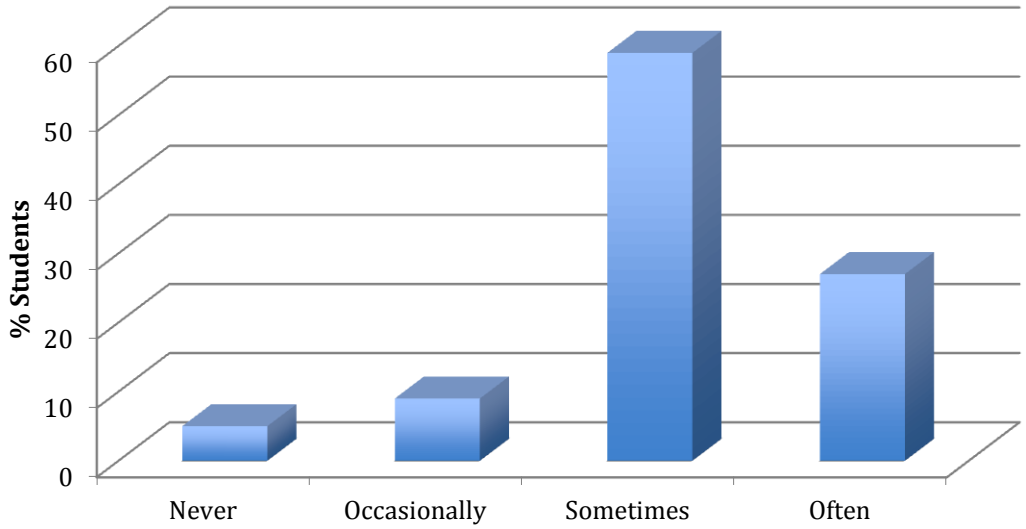

Figure 25: Student assessment of family's healthy eating habits

6.3.2 Valley View Elementary School action plan. The Valley View wellness committee assessed the school's education, infrastructure and outreach endeavors in order to create their long-term action plan (Appendix C), which is summarized below (by vision statement).

1. *We teach our students and staff which foods are healthy.*
    - Valley View's will continue to provide MyHealthyWorld curriculum to seventh and eighth grade students
    - Valley View is implementing a new school food policy that will eliminate junk foods and sodas from the school grounds.
2. *We teach our students and staff where to get healthy food.*
    - Valley View is implementing a fruits and vegetables grant ,which provides fresh fruits and vegetables to students during school hours, making Valley View a location where students can obtain healthy food.

- Valley View will include information about local grocery stores and farmer's markets with good healthy food selections to parents, staff, and students during the beginning of the school year health training that will accompany the school's new campus food policy.

3. *We teach our students and staff how to prepare healthy foods.*
    - Valley View is planning to incorporate healthy food preparation knowledge into community workshops in the future. The beginning of school year 2013-2014 will include training on the implementation of Valley View's changes to the school food policy, providing an opportunity to provide these workshops.
    - Valley View will seek collaboration with other organizations working on this challenge, such as the Orchard Community Learning Center and Roosevelt School District's new community school.
4. *We teach our students and staff how to be active.*
    - Valley View students will continue to take physical education courses, and the seventh and eighth grade students will receive in depth coursework on healthy eating and maintaining an active lifestyle.
    - Staff and teachers at Valley View will continue to have the opportunity to participate in after-school fitness gatherings.
    - Valley View plans to build more active time into the daily school schedule, and will frame these experiences as study breaks, rather than as recess, in order to align with state standards.
5. *We teach our students and staff where to be active.*

- Valley View will continue to provide supervised active play for students after school several days a week for students, with a late bus provided to get them home safely. Staff members also have opportunities to take fitness classes at the school after hours.
- Valley View will provide students, staff, and their families, with information about nearby parks, schools, fitness facilities, and community recreation centers.

6. *Our school is walkable and bikeable.*
    - Coronado scored a 37 out of 100 on the website Walkscore, which rates walkability through metrics like average block length, intersection density, link/node ratio, and route directness. Therefore, Valley View will make initial inquiries into enrolling in the Safe Routes to School Program.
    - Valley View will also engage students and staff in challenges to bike or walk to school.
7. *Our school has indoor and outdoor recreational space.*
    - Valley View's outdoor fitness facilities include a soccer field, three outdoor basketball courts, a playground, two backstops for softball and baseball, and a small practice field. Indoor facilities include an indoor gymnasium as well as classroom space that is used for staff fitness activities after school hours.
    - Valley View will continue to improve the quality of its recreational spaces, and when possible will forward on the planned phase two of its fitness infrastructure improvements.
8. *Our school has a healthy school lunch program.*

- Valley View is implementing a radical new school food policy for foods brought from home and for competitive foods served in the cafeteria. The new policies will include:
    i. Elimination of sugar-laden food items (including candy and sodas).
    ii. Elimination of multi-serving bags of chips and other junk foods.
    iii. Requirement that students consume fresh fruits and vegetables at snack time.
    iv. Elimination of food consumption during recess.
- These changes will be enforced after a training period at the beginning of academic year 2013-2014 for students, staff, and parents.
- Valley View will continue to work with the Roosevelt School District to improve the healthfulness of the district school lunches, including the introduction of more local and sustainably grown products.

9. Our school has a school garden.

- Valley View has many small school garden sites available on campus, as well as farm animal enclosures that are inhabited by chickens, goats, geese, and ducks.
- Valley View will look into hiring a volunteer farm-to-school coordinator to maximize student use of the school garden facilities.

10. We provide our community with opportunities to be active.

- Valley View has opened its school grounds for community recreational usage, including the basketball hoops, softball and baseball backstops, and soccer field.

- Valley View will look into hosting recreational sports leagues or sports events that are open to all community members.

11. We share information about nutrition and healthy living with our community.

- Valley View is planning to incorporate information about nutrition and healthy living into its training sessions for the upcoming changes to the school food policy.
- Valley View will include more information about healthy living into its current community outreach letters and e-mails.

12. We allow community involvement in our school garden.

- Valley View will engage the community in garden work days to continue to improve the garden and to strengthen community ties.
- Additionally, Valley View may seek community volunteers to engage students in school gardening during the school day.

6.3.3 Valley View student BMI data. Valley View's physical education instructor elected to record student BMI data, as revealed in the figures below. As the data shows, 50% of Valley View's students are either overweight or obese.

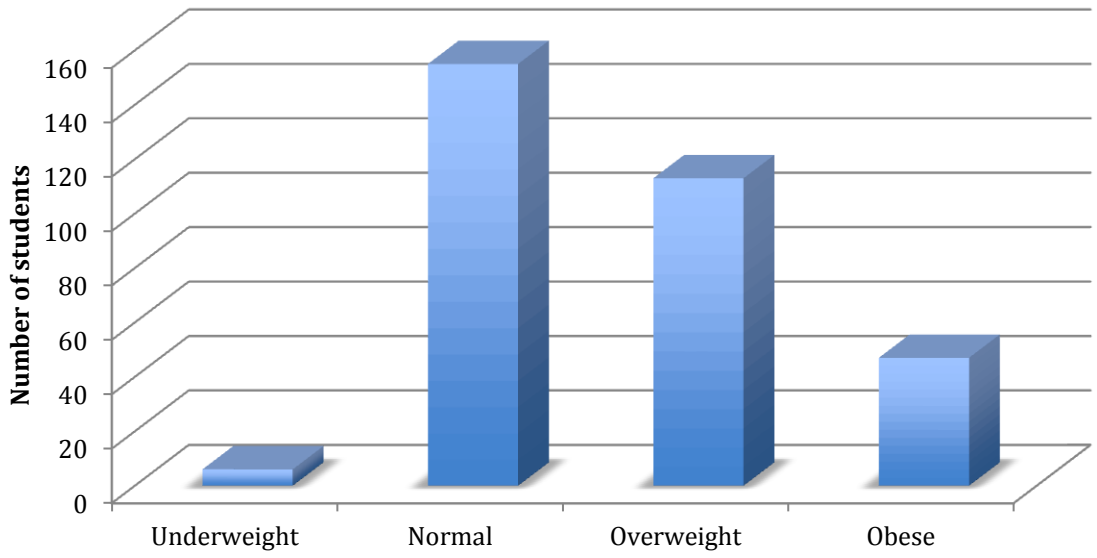

Figure 26: Valley View Elementary BMI data

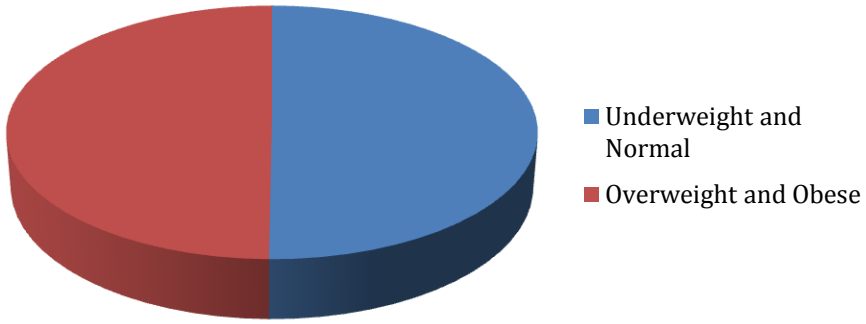

Figure 27: Valley View students - BMI pie chart

Chapter 7: Discussion

At the conclusion of any research progression, the gathered information is sifted and winnowed in order to provide answers to the burning questions that initiated the process in the first place. The following is a summary of this dissertation's original research questions, how they were answered through the process of conducting and analyzing the research, and a discussion of the implications for the fields of sustainability, school-community engagements, and childhood obesity.

7.1 What role are schools playing in the sustainable development of their communities?

The objective of answering this question was to provide a baseline understanding of the current role of K-12 schools in the field of sustainability. It was revealed that schools are very rarely focused on *both* sustainable development and community development. There are many excellent examples of schools whose community engagement efforts provide benefits for both school and community stakeholders, such as Noble High School where the community provided guidance on school planning and construction (Bingler et al., 2003). Additionally, the recent interest in sustainability and the "green" movement have spurred thousands of school initiatives that are focused on sustainability in one sense or another, such as the schools highlighted by the U.S. Department of Education Green Ribbon Schools awards (Suarez Falken, 2012). The merging of these two types of efforts appears to be rare, and therefore the case study research embedded in this dissertation filled a unique niche in the fields.

This is especially pertinent when examining the narrow scope covered by schools that are allegedly at the forefront of the sustainability movement. An analysis of the U.S. Department of

Education's Green Ribbon Schools revealed that the majority of these schools are qualifying because of infrastructural change, rather than through changes to educational practices (U.S. Department of Education, 2012). And though our environment certainly shapes our behaviors, lasting changes must also incorporate shifts in knowledge and values (Heath & Heath, 2010).

7.2 What framework can schools use to guide their efforts toward community sustainability?

The first element that was necessary to answer this question was a reflection on the ways in which schools interact with their communities (Sanders & Harvey, 2002). School-community interactions can be lumped into three general types: education, outreach, and infrastructure. Actions that guide efforts toward improved community engagement must be spread out across all three of the gateways in order to ensure maximum benefit. The second element that provided an answer to this question was an understanding of the forces that contribute to social-behavioral change. Though many methods attempt to change behavior through education alone, it was revealed that it is the combination of knowledge, values, and environment that truly result in one behavior or another (Heath & Heath 2010). Therefore, for schools to guide their efforts toward community sustainability they must a) disseminate knowledge through education and outreach and b) alter the infrastructure of their school in order to reinforce sustainable behaviors and display sustainable values.

7. 3 How can schools in the Phoenix Metropolitan area address sustainability problems like childhood obesity?

Solving sustainability problems is no easy task, but schools can play a significant role in the effort. Schools are powerful forces in their communities because they reach a huge percentage of the population and because their land is often one of the largest and most visually noteworthy pieces of property in the community (MacKinnon, 2001). Therefore, for schools to address sustainability problems, like childhood obesity, it is essential that they make changes to their schools educational content, outreach activities, and infrastructure in order to shift their community from an unsustainable state to a sustainable one. However, these changes must be done strategically. This is where sustainability science toolsets come in to play. A sustainability problem must be systemically mapped, so the upstream drivers and downstream outcomes are fully understood (Wiek et al., 2011). Then, it is essential to create goals toward which each of these system elements can progress to (Loorbach & Rotmans, 2010; Loorbach, 2007). Transition management methods such as visioning play an important role in this process.

From this understanding, it is possible for schools to examine their potential in shifting the system by exerting force on the components that are within their control. As an example, schools often have large amounts of recreational space and fitness facilities that are utilized by students during school hours and then left vacant at all other times (MacKinnon, 2001). Because one challenge faced by many communities is a lack of these types of facilities, a school can use their physical assets to provide their community with a safe place to recreate (Beaumont & Pianca, 2000; Jackson & Sinclair, 2012).

7.4 What would it look like in Phoenix Metropolitan schools and their surrounding communities if childhood obesity were eliminated?

This question is answered through the production of the vision, produced collaboratively with the researcher and the vision workshop participants. The vision is mapped over the problem system map, which ensures that the solution actually addresses the upstream drivers of the problem, as well as the downstream effects. For example, several of the upstream drivers of the childhood obesity epidemic in the Phoenix Metropolitan Area include environmental and infrastructural challenges such as food deserts, lack of safe opportunities for walking and biking, and legislation that encourages the production of nutritionally deficient foods (Crouch, 2011). The vision describes a community that has equitable access to healthy, affordable, unprocessed organic food. A community that is so walkable and bikeable that the majority of citizens walk or bike to school and work. And one where food legislation has evolved, so that school lunches are filled with healthy fruits and vegetables, and. The Farm Bill provides funding for fruits, vegetables, and community gardens.

Other snapshots from the vision for the Phoenix Metropolitan Area include families that are knowledgeable about good nutrition and how to make healthy food choices. There is an abundance of small-scale urban agriculture, like family and school gardens, and families take cooking classes at school that promote the use of all the available fresh produce. School curricula start with kindergartners to encourage healthy eating and an active lifestyle. There is an abundance of open space and recreation programs, and schools have partnered with area recreation facilities to offer reduced gym memberships. Kids would rather play outside or be

otherwise active than engage in sedentary activities like watching TV or playing video games. And to top it all off, there are no chemical contaminants in our food and water.

Though this vision seems idyllic, it serves many important functions. It provides an ideal toward which steps can be taken (Park et al., 2009). If visions were written through the lens of only what is possible or likely, then we trap ourselves within the confines of the status quo. A transition to sustainability requires radical thinking, and opening our minds to possibilities outside what we have learned to expect (Loorbach & Rotmans, 2010; Loorbach, 2007). The verbalization of goals that seem impossible is a crucial first step in breaking down the journey into achievable milestones that enable the transformation.

7.5 What can be done to the current outreach activities, educational activities, and infrastructural changes at each school to move them from our current state to our vision to solve childhood obesity?

The two schools composed their own unique action plan for the ways they could transform their outreach activities, educational activities, and infrastructural changes in order to begin moving toward the vision for a phoenix Metropolitan Area without childhood obesity.

Valley View Elementary School has introduced nutrition and physical activity curriculum for their seventh and eighth grade students. They are planning to implement a junk food ban at their school for school year 2013-2014, and this will include an outreach component to family members of their students. This is promising, because evidence has shown that schools that take a stance on these unhealthy foods have seen improvements in student obesity levels (Taber et al., 2012). Valley View's outdoor fitness facilities are open to their community as well, and they

have created an afterschool active play opportunity for their students on school grounds, with supervision and a late bus to bring students home. Their school lunch program is in a state of constant improvement due to a district-wide initiative to improve the nutritional quality of the food and incorporate more fresh and locally grown items. Valley View has an excellent school garden infrastructure that has gone underutilized during the past few years due to budget constraints. Reincorporating them into the students' curriculum is an important component of their long term goals for student and staff health. Valley View also created a wellness committee, with support of the principal, which keeps their efforts on track and provides collaboration between the teachers and staff heading up different initiatives.

Coronado High School surveyed their students to create a baseline against which they could measure progress toward their vision. Because there is currently no curriculum at Coronado that addresses nutrition, the Physical Education instructor is incorporating several days of nutrition curriculum into the sexual health course all freshman students are required to take. Several of the school's science instructors have also begun to incorporate nutrition education into their curricula. Several teachers at Coronado have been working arduously for the past several years to complete the school's vegetable garden. With the improvements made over the course of the action research process, the garden will be fully functional for school year 2013-2014. The garden facility will be used for both student and community nutrition and gardening education, which is promising since school gardens have been shown to improve community engagement and familiarity with health foods (The DRA Project, 2008). Improving the school's lunch program and opening up school facilities for community use are important action items for the future.

7.6 What are common carriers and barriers for implementation of a sustainable transition in Phoenix schools and what can other schools take away from the findings?

One significant barrier faced by both schools was the challenge of finding the staff time and financial resources to achieve their goals. Because education funding has plummeted both nationwide and especially in Arizona, finding the time and resources for initiatives outside the scope of normal education endeavors is extremely challenging. A carrier for this process was administrative support and planning. Valley View had an official wellness committee to work on their childhood obesity mitigation strategy, and their principal was a member of the committee. This administrative buy-in helped keep the process moving and ensured that the efforts were not pushed to the wayside. Another significant carrier to the process was the motivation and passion displayed by a select few of the teachers at each school. This is a carrier we must regard with some reserve, for it is extremely tenuous. If one of these driving teachers leaves, then the efforts he or she was moving forward are often lost. For this reason, having a committee to manage efforts like these is much more resilient.

One unique way to overcome these barriers is the model utilized by The San Francisco Unified School District. In 2006, the citizens of San Francisco passed Proposition A, which provided a $450 million bond for the improvement of San Francisco's schools. One of the programs funded by this bond is Education Outside, which facilitates green schoolyards in order to create outdoor learning environments (Education Outside, 2013a). One of the most significant contributions Education Outside provides is The Corps for Education Outside, which funds the training and maintenance of outdoor educators to manage the green schoolyards. In other words,

rather than placing the burden of managing sustainable initiatives onto a handful of motivated teachers, San Francisco has funded official positions whose sole job is to help schools become more sustainable. These Corps Members serve as the point person for all outdoor education and school greening activities at their school sites, and have been placed at more than twenty of San Francisco's public schools to date (Education Outside, 2013b).

Having a facilitator whose funding comes from somewhere other than the school's budget makes a significant positive impact on the program's success. In a sense, I served this role for the schools in my research. I helped to keep their progress on track, and they did not have to pay for my time or effort. And as much as I attempted to ensure shared ownership of the process, at the end of the day, if there is not time or funding for these types of efforts, they will be lost.

7.7 On combining multiple approaches

This dissertation combined approaches from the fields of sustainability, transition management, and social change. Some of this synthesis was incredibly useful and productive, while other couplings were less successful. One blend that was especially useful was the combination of tools from the fields of sustainability and transition management during the vision workshop. Without the problem map that resulted from systems thinking, the participants would have lacked a holistic understanding of childhood obesity as a problem. This systemic conceptualization allowed the participants to craft a vision that mapped directly onto the problems that each statement was meant to address. Additionally, the utilization of Gibson's

principles ensured that the created vision also addressed a multi-faceted conception of sustainability.

Also useful was the utilization of social change theory in crafting the problem map for childhood obesity. Breaking down the problem into elements that affected knowledge, environment, and values, allowed for a more nuanced understanding of cause and effect (Heath & Heath, 2010). Rather than focusing solely on actions, this approach facilitates an evaluation of the driving factors that lead to actions. However, this utility partially broke down when the tools from social change theory were applied to actions the schools actually wanted to take. The methods by which values are transformed are complex interactions between increases in knowledge, shifts in societal norms, and the accumulation of personal experiences (Calman, 2004). For schools, it is much easier to alter the knowledge that they provide their students and community, or to alter the environment in which they immerse them, than it is to attempt to shift values.

To speak to the very concept of combining multiple approaches under the umbrella of sustainability science, I found this exercise extremely beneficial. If sustainability is to integrate itself into all arenas, then it only makes sense to learn to couple tools from sustainability science with tools from other fields. Sustainability science can provide new perspectives for the fields to which sustainability problems apply. For example, one pressing sustainability problem is the rapid expansion of energy consumption. Many fields are tackling this problem: engineering, geology, hydrology, economics, etc. If sustainability science tools were to permeate these fields, then ideally their perspectives on the problem would be more holistic, their solutions would be more future-oriented, and the outcomes would be more sustainable. In this dissertation, the

application of sustainability science tools to the problem of childhood obesity allowed two schools to come up with action plans that addressed not only student behavior, but the forces that influenced those behaviors in the first place.

Chapter 8: Conclusions

I end this dissertation with my reflections and conclusions about the results of this research process. Some of the research questions were answered in ways that I may have been able to predict from the start. Others almost seemed to take on a life and direction of their own, which is one of the many exciting aspects of engaging in action research. Because both researcher and participants influence the progression of action research, the research process at times took pathways that were surprising and lead to outcomes that went beyond the limited imagination of the researcher alone. I firmly believe that this approach provided the stakeholders involved with useable knowledge and end results, and have no doubt that future schools and sustainability scientists could benefit greatly from this work.

8.1 Two schools, two approaches

The first surprising outcome I will explore is the divergent approaches the two case study schools utilized in the process of translating the vision into an action plan. Though both of the schools operated from the same set of shared vision statements, their progress, action plans, and methods were quite different. Valley View elected to create an official administration supported wellness committee and then immediately moved forward on several school-wide initiatives to address student and staff wellness. Their approach stayed true to the school's hands-on education model, as they immediately mobilized their efforts, even prior to full completion of their action plan. Coronado, on the other hand, began their work by completing an assessment of the their students' wellness knowledge, their school's wellness infrastructure, and their school's outreach efforts before they created their action plan and began to mobilize their efforts.

8.1.1 Action based vs. planning based approaches. Each of these approaches has some benefits and some detriments. At the end of the first year of this effort, Valley View has more tangible results and initiatives than Coronado. However, these initiatives are largely focused on changing student and staff behavior and on increasing student and staff knowledge about proper nutrition. This lack of systemic methodology has led to a concentration of efforts only on specific problem areas, rather than on the problem as a system. One explanation for this is that most of school staff that joined Valley View's wellness committee were not involved in the vision workshop or in the sustainability problem solving training. The committee was open to any interested staff and administrators, and the review of the sustainability problem solving methods took a back seat to attempting to get as much done as possible in the limited time the committee members had to offer. Fortunately, Valley View has the incredible support of their administration, both at the principal and district levels. Valley View's principal turned over at the beginning of the 2010-2011 school year, and Coronado's turned over at the beginning of the 2011-2012 school year. This one year advantage seemed to give Valley View an edge in garnering administrative support. For this reason, they have been able to make significant growth in their efforts to improve school health. Coronado, on the other hand, has utilized a much more cautionary approach, perhaps due to the fact that their administration was less involved in the process and therefore there was a less immediate support system with which to take action. It is important to note, however, that if moved forward Coronado's action plan is potentially more strategic. Their planning based approach allowed them to get a more holistic picture of their school's practices and infrastructure that could be either mitigating or promoting childhood obesity. This front-loaded effort may give them better outcomes in the long run.

8.1.2 Role of educational pedagogy in each approach. It is also interesting to note that the action based and planning based approaches also seemed to correlate with the general education philosophy of each school. Valley View embraces an expeditionary education model, which emphasizes the process of learning through doing. Therefore, it makes sense that their approach to mitigating childhood obesity would involve jumping into immediate action to experiment with different solutions. Their teachers and administrators are passionate about the benefits of hands-on learning, which is evident in their obesity mitigation work. Coronado, on the other hand, holds a more traditional educational pedagogy. Their curriculum is more tightly linked with state standards, and their classroom practices are less experimental. Therefore, the development of a structured plan prior to taking action is a reflection of their school culture. It is also important to note that Valley View is a K-8 school and Coronado is a 9-12 school. There is bound to be more pressure to adhere to strict standards in a high school because there is an expectation that the students are being prepared for college entrance (McDonough, 1994). This pressure makes it much more difficult for high schools to innovate, especially when it comes to curriculum that is not part of the mandated state standards.

8.2 Barriers and challenges

When the research participants asked about the barriers that they faced during this research process, there were several prominent responses. The first was a sense that their efforts were running up against "red tape." For example, Valley View wanted to increase the amount of time their students spent outside and active. But state standards dictate that recess is not included in instructional hours, which students must meet a minimum of (Arizona Department of

Education, 2008). This has forced the school to try to incorporate active time into class time, which in turn reduces teaching time for the teachers who want to provide their students with more opportunities to be active. Attempting to change the school lunch menu is also much more complicated that it would appear on the surface. Schools are beholden to the decisions made by their district, which are often dictated by cost. Even something as simple as bringing vegetables from the school garden into the school cafeteria can be a confusing process (National Policy and Legal Analysis Network to Prevent Childhood Obesity, 2011). Additionally, both schools faced changes in leadership over the past two to three years. Since new principals need time to understand the way a school functions and the culture of a school, there can be a delay in getting new initiatives started.

Two more barriers expressed by the research participants were lack of time and money. Both schools wanted to do more, but were hindered by the lack of funding to assist their efforts. Schools across the nation are witnessing drastic decreases in funding for all school initiatives that are not directly related to state standards and testing, making it unlikely that something new, such as childhood obesity mitigation, is going to receive monetary support (Travis, 2010). Arizona spends an average of $7,666 per student annually, which is well below the national average of $10,560 (Reid, 2013). Many schools are essentially in survival mode, taking on only the bare minimum to get by with their limited budgets. In essence, this means that these initiatives must rely solely on unpaid time and effort from the teachers, administrators, and community volunteers involved. This makes these projects especially vulnerable, for they are the first to be eliminated when participants face stressors on their time.

Despite these challenges and barriers, the action plans produced by the participants at both schools are full of excellent ideas and are based on their visions of a Phoenix without childhood obesity. Unfortunately, many of the suggestions will require extra effort, human resources, and potentially funding. This seems unlikely in economic times where music education, art, and physical education routinely face the chopping block (Travis, 2010). As our nation considers education reform, it will be essential that K-12 schools not be regarded as separate and independent from their communities, but rather as community hubs, full of potential and influence.

8.3. Successes and forward momentum

Of course, there were also many things that moved the schools' efforts along. Valley View Elementary proved that with supportive leadership, changes in school initiatives can happen rapidly. They initiated many new efforts to address childhood obesity, and will be implementing a new school food policy beginning in the fall. Both schools were also able to add many items to their action plans that can be implemented without the necessity of additional funding and also without excessive time commitments. For example, Coronado's science teachers were able to adapt nutrition curriculum in a way that it could serve their schools science standards as well. Creative solutions like this one that utilize the resources at hand provide excellent opportunities to keep the momentum moving forward. Many of the participants also indicated that the research process itself created a sense of accountability, which helped to motivate them to keep going.

One important success of the research process was the increase in sustainability competencies amongst the participants in the case study. A follow up survey of the participants asked whether or not their understanding of sustainability increased, to which all respondents answered yes (Appendix E). Additionally, all of the participants responded that they would feel comfortable using these sustainability problem-solving tools again in the future on their own, which indicates capacity building. This provides hope for the future of sustainability science outside the walls of academia, because these individuals were able to utilize sustainability science toolsets after only a moderate amount of training.

8.4 Schools as leverage points for community sustainability

Schools that work synergistically with their communities are able to exchange assets like facilities and faculty for expanded learning opportunities and political support (Bingler et al., 2003; Patterson, 2002; Sanders, 2001). The schools in this case study have taken initial steps to strengthen their bonds with their surrounding community. They have opened some of their facilities to community use, provided opportunities for students and families to get involved with school gardens, and will be adding excerpts on healthy lifestyle to their newsletters that reach out to the families of their students. My research findings revealed that this approach, the sharing of school resources with the surrounding community, can shape the community environment and serve as community development. Heath and Heath discussed the importance of creating an environment that fostered behaviors that make the change you wish to see easier for those attempting to change (Heath & Heath, 2010). By providing school facilities to the community for fitness purposes, the school is changing the environment of the community, making it easier for

the residents to be active. To speak to the more broad concept of schools as leverage points for community sustainability, a school could also change the community environment by providing space for a community garden, by providing space for a community solar array, or by offering to serve as a collection point for community recycling. MacKinnon pointed out that when schools are utilized as opportunities for community development, it is possible to use public funds more efficiently (MacKinnon, 2001). This allows for a local municipality to, for example, further develop school facilities for community use instead of building an entirely separate community center with almost all of the same equipment. My findings revealed that one of the largest barriers schools face when attempting to foster sustainable community development is limited funding. The community school approach, which allows for synergy between schools and other development options, is therefore a viable solution.

Because schools can actively shape the environment of their community and serve as a dissemination point for new ideas, there is enormous potential for them to function as leverage points for community sustainability (Schelly, Cross, Franzen, Hall, & Reeve, 2010). If sustainability were a high priority for a school, they could spread knowledge through classroom teaching and community outreach, and could also embrace sustainable practices on their school grounds. The case study schools used this method to promote community childhood obesity mitigation by providing healthy living information to their students and community, and by making efforts to ensure that the fitness and recreational facilities of their school promote physical activity.

This dissertation also has significant implications for the field of school-community engagement because it points to the fact that these efforts often lack strategic planning and

direction. Sanders performed a survey of over 400 schools to investigate their community partnerships. The survey results revealed that the vast majority of school-community engagement occurs between schools and businesses, and that these partnerships do not always provide an adequate level of benefit to the school (Sanders, 2001). My research provided a solution to this challenge, in that the schools were able to first establish the goals for the outcomes of their community engagement through the process of creating a vision. This vision worked as a framework for determining the most beneficial school-community partnerships they could engage in. Vision creation, as well as the other tools utilized in this dissertation, can help schools harness their efforts for maximum impact, addressing the problems that are most pressing and important first. For the schools in my case study, the analysis allowed them to focus their resources on the areas over which they could have the most impact for their students, staff, and community for the mitigation and prevention of childhood obesity.

8.5 Implications for sustainability science

Sustainability science engages in problem-solving efforts that aim to address humanity's most urgent needs (Clark, 2007). These challenges are highly complex, show huge potential for damage, and have no obvious optimal solution (Wiek et al., 2011). Their efforts require the utilization of the best toolsets available, and these tools must allow the scientists to see the challenge as part of the larger picture. This dissertation utilized these tools to assist in the creation of a sustainable solution to childhood obesity for schools. And through this process, it proved that not only are school stakeholders capable of utilizing sustainability toolsets, but that with a little guidance they can create a plan that truly takes the future into account. Through this

process, this research adds to the sustainability science literature on stakeholder engagement, citizen science, and on case studies that engage sustainability problem solving methods.

This type of research is crucial for the sustainability movement, because it provides a bridge between theory and practice. The evidence has revealed time and again that sustainability science is not reaching the wide audience for which it is intended (van Kerkhoff & Lebel, 2006). Therefore, new methods of disseminating sustainability science and toolsets into the broader community must be explored. Small case studies like the ones presented in this dissertation serve as grounds for free experimentation: an opportunity to innovate and take risks. The lessons learned can then be refined, honed, and expanded for use on a larger scale.

One of the original innovations this dissertation contributes to the field of sustainability is the utilization of a problem map as a framework for building a sustainable vision that addresses the problem holistically. The success of this utilization of systems-thinking competence affirms that this process of evaluating the feedback loops, cascading effects, and causal relationships of a system is a critical component of sustainability problem solving (Wiek et al., 2011). If the participants in the case study has not invested time into understanding the full systemic nature of childhood obesity, their solutions would have likely have suffered the same fate as much of the obesity mitigation field: an inflated emphasis on individual actions rather than on the forces that promote those actions. A revealing example of this is a book from the local children's library titled, "How to deal with obesity." The book informed children that you are what you eat, and essentially claimed that if the child would simply eat smaller portions and be more active, then they would not be obese any more (Robbins, 2010). Of course these actions contribute to the solution, but there were no mentions of the obesogenic environment in which children are

immersed. The tone of the book essentially placed the blame entirely on the child and gave no consideration to all that is outside of a child's control.

Another innovation this dissertation provides the field of sustainability problem solving is a layperson-accessible system of doing a sustainability assessment, which utilizes small pictures that represented each of Gibson's principles. This process ensured that the participants in the case study were able to create action plans that were both sustainable and strategic. By ensuring that each of Gibson's sustainability principles was given representation on the vision map, the participants were able to ensure that no consideration for sustainability had been overlooked. The small pictures worked to remind the participants of the meaning of each principle as well as functioning as a visual tool for balancing the distribution of the pictures.

8.6 Implications for transition management

Transition management was developed in response to new problems that seemed unsolvable using traditional methods, due to the fact that the old methods were unable to account for the future (Loorbach, 2007). To rectify this, transition management methods begin by crafting a vision of the future, and use this vision to steer the actions we take in the present. The transition management literature also makes the case for the utilization of case studies, even single case studies, as the basis for generalization since they can allow for analytical generalization rather than statistical generalization (Loorbach & Rotmans, 2010). This dissertation provided a successful example of the utilization of these methods, and also contributed a case study for analysis.

The most thorough utilization of the transition management methodology occurred during the process of creating the sustainable vision. The participants were able to really take their time imagining transition paths, and examining the system dynamics that would contribute to the future they desired (Loorbach, 2007). My research findings affirm the utilization of visioning as an effective tool for fostering long-term strategic planning. Because the participants invested time into creating a vision that not only spoke to their ideal resolution of the childhood obesity problem, but also considered the systemic nature of the problem and relevant sustainability considerations, they were able to begin building strategies that were far more robust and justified. The basic steering philosophy of transition management is that of anticipation and adaptation, starting from a vision and then progressing to experimental actions (Loorbach and Rotmans, 2006). This approach proved successful for the case study participants, and lead to plans for a series of initial interventions to challenge childhood obesity at their schools.

However, transition management is not the sort of process that can be completed during a two year case study. It requires reflection on the process as it occurs so that the plan can remain flexible, and to adapt over time as unexpected changes occur (Rotmans & Kemp, 2008). Therefore, it is somewhat impossible to do a full utilization of transition management literature since the time scale for completion is so large. The components of transition management that the research participants were able to utilize in the time available did allow for future-oriented problem solving. It was apparent that to address childhood obesity in the long run, schools would have to help shift both culture and environment. This is in sharp contrast with many childhood obesity initiatives, which focus on changing actions in the present without focusing on larger systemic changes for the future (Brennan, 2011). This is an important success for the case study

literature on transition management, because it was a successful alteration of the thinking and planning the participants were engaging in, from a narrow time scale to a much broader one.

8.7 Take away points for the future

This research was undertaken in order to explore the role schools can play in sustainable community development. This was explored first by examining the way school stakeholders could engage in sustainability problem solving. The research process involved the transfer of a variety of problem solving toolsets from the researcher over to the participants in the research, as a demonstration of action research. This process proved an important point, which is ordinary people can engage in sustainability science if they are given a little training. This speaks to the importance of getting sustainability science to permeate into the broader culture. My hope of course is that these practices would slowly work their way into every segment of society, so that they become second nature.

The toolsets utilized by the participants were pulled from a diverse range of disciplines, an exercise that turned out to be very beneficial. The combination of sustainability science tools with tools from other fields is a practice that I now feel is essential to the progression of the field. It is essential because it allows sustainability science to permeate these fields, a necessary step if we are to achieve a global sustainability transition.

The next exploration of the role schools can play in sustainable community development was through the creation of long term action plans that leveraged methods of social change. The school stakeholders were able to conceptualize that in order to mitigate childhood obesity, their school needed to not only change the actions that their students were taking in the present, but

also the environment around their students, the knowledge they were providing their students, and the values their students held. This was where the importance of community development became apparent, because changing these things in the school alone would never be enough to fully address the problem. The schools are only one piece in the larger puzzle that is a community. Therefore the schools built their action plans to move forward on mitigating this problem in partnership with their communities.

I believe that the most surprising and inspiring success of this research is the evidence that sustainable problem solving is possible by non-experts, provided that they are given some guidance. And it is the individuals in schools and in communities that are fighting to take sustainability from the fringe into the center.

Can schools be leveraged to make their communities more sustainable? Absolutely. All of the pieces are in place for schools to be a tremendous force in the transition to a sustainable future. Partnerships with schools by governments, education institutions, and non-profit organizations will have the dual benefit of creating change now, and investing in change for the future by shaping our youth. It would be incredibly wise for our culture to shift our perception of schools from one that sees them as recipients of our resources to one that sees them as a rich reserve of resources that can be tapped into to help shift us away from the unsustainable trajectory we are currently on.

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APPENDIX A: VISION WORKSHOP POLISHED REPORT

JUNE 2012

ENVISION

By 2030...

childhood obesity is no longer a problem for the Phoenix Metropolitan Area.

THE YEAR IS 2030 IN THE PHOENIX METROPOLITAN AREA AND CHILDHOOD OBESITY IS GONE.

Families are knowledgeable about good nutrition and the science behind food cravings. There is widespread awareness about how to make healthy food choices. Every community has access to healthy, affordable, unprocessed organic food. It is now easier to find healthy food than junk food! This has been aided by an abundance of small-scale urban agriculture, like family and school gardens. Food legislation has evolved, and school lunches are now filled with healthy fruits and vegetables, served on real plates instead of Styrofoam. The Farm Bill sponsors community gardens instead of just food stamps. There are no chemical contaminants in our food and water. Kids and their families take cooking classes at school that promote the use of all the available fresh produce. Overeating and unhealthy snacking have plummeted, and junk food is rarely consumed.

The school curriculum starts with kindergartners to encourage healthy eating and an active lifestyle. Most kids walk or bike to school, filling up the bike racks! They get to be active every day at school, and schools offer sports programs that serve both the kids and their families. There is an abundance of open space and recreation programs, and schools have partnered with area recreation facilities to offer reduced gym memberships. Kids would rather play outside or be otherwise active than engage in sedentary activities like watching TV or playing video games.

EDUCATION

We teach our students and staff...

1. Which foods are healthy
2. Where to get healthy food
3. How to prepare healthy foods
4. Why we crave unhealthy food
5. How to be active
6. Where to be active

INFRASTRUCTURE

Our school

1. Is walkable and bikeable
2. Has indoor and outdoor recreational space
3. Has a healthy school lunch program
4. Has a school garden

OUTREACH

We provide our community with

1. Opportunities for fitness through sports leagues and partnerships with local fitness facilities
2. Classes and fairs about nutrition
3. The opportunity to get involved with our school garden

ADVOCACY

We will advocate for...

1. Better school lunch guidelines
2. Clean water, food, and air
3. Subsidies for vegetables and fruit
4. Funding for school gardens
5. Food access justice

OUR PARTNERS

Arizona State University
School of Sustainability

Coronado High School

Valley View Elementary School

South Pointe High School

APPENDIX B: CORONADO HIGH SCHOOL ACTION PLAN

CORONADO HIGH SCHOOL

A Sustainable Approach to Solving Childhood Obesity Through Education, Community Outreach, and Environmental Change

Produced in collaboration with

Arizona State University

School of Sustainability

PhD Candidate Tamara Lawless

Vision Statements - Education:

Schools can create change through their educational activities, which are direct learning experiences provided for students, faculty, staff, and community members. This is not limited to what students learn in the classroom, but also includes knowledge that is internalized by the faculty and staff of the school and knowledge that students, faculty, and staff share with their friends and families.

Vision Statement #1: We teach our students and staff which foods are healthy.

Q: How will we measure our progress toward our vision of teaching our students and staff which foods are healthy?

A: Progress will be measured though comprehension of the "MyPlate" graphic produced by institutions like the USDA and the Harvard School of Public Health.

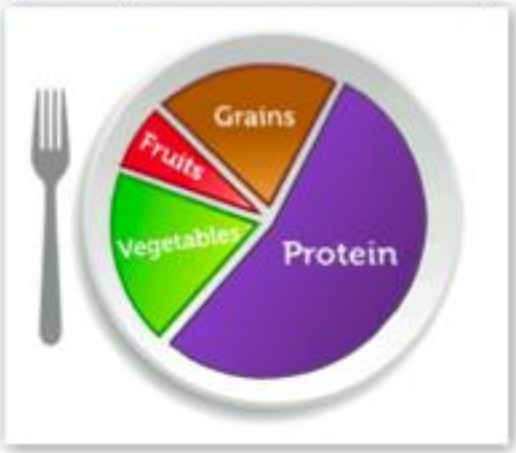
Q: What is current status of student comprehension of MyPlate?

A: Coronado H.S. students currently place a disproportionate emphasis on protein in their diets, especially relative to vegetables and fruits.

MyPlate (Harvard version)

VS

MyPlate (Coronado student version)*



Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can integrate MyPlate and other nutrition curriculum into Coronado H.S. physical education department classes as well as other Coronado H.S. courses. Additionally, placement of MyPlate displays can be placed in the cafeteria, and nutrition information can be sent home or e-mailed to families with other Coronado news.

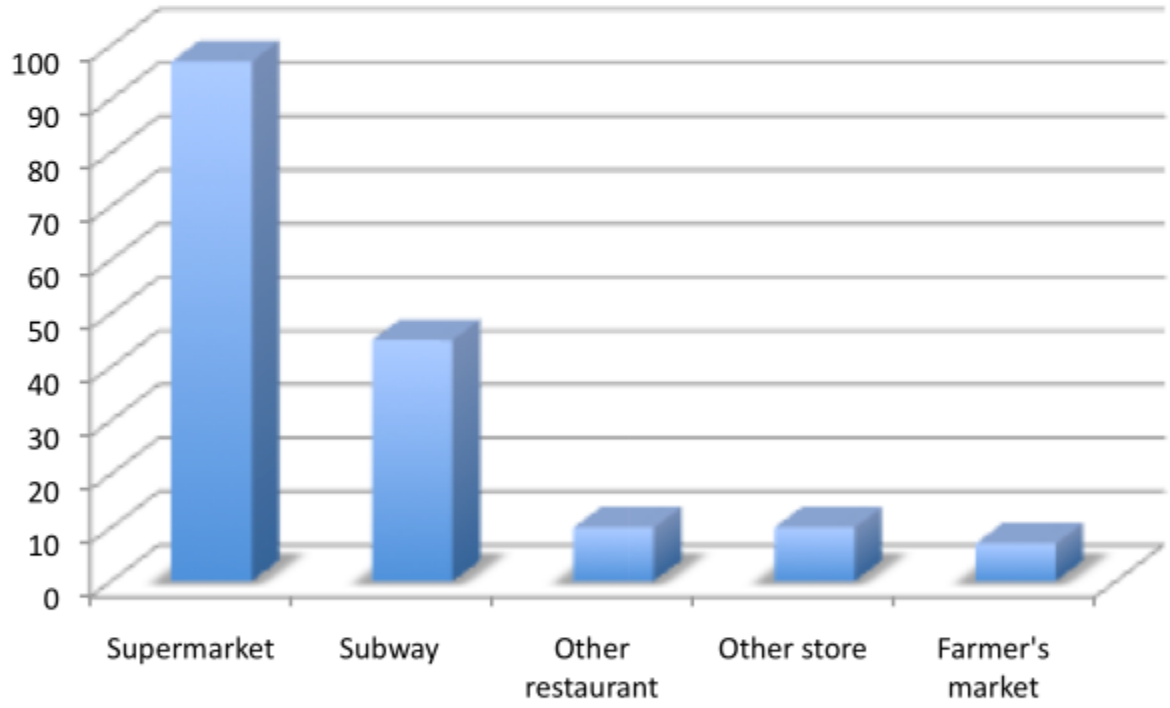
Vision Statement #2: We teach our students and staff where to get healthy food.

Q: How will we measure our progress toward our vision of teaching our students and staff where to get healthy food?

A: We will periodically survey students and staff to ensure that they are aware of community opportunities for healthy food purchasing.

Q: What is current student awareness of opportunities for healthy food purchasing?

A: The majority of Coronado H.S. students choose to purchase healthy food at a supermarket such as Fry's or Fresh and Easy. A substantial percentage also perceive Subway restaurants as a good location to purchase healthy foods. Few students are aware of other local opportunities, such as community farmer's markets.



Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can integration food shopping curriculum into life skills classes. Additionally, Coronado can spread information about local healthy and sustainable food purchasing opportunities to students and staff through newsletters, PSA's, or creative signs and posters.

*From previous page: Coronado students were asked in an anonymous survey to fill in the boxes of the MyPlate with the correct food group labels. This image was created by comparing what the students selected as the food group that would fill the largest portion of the plate (which is *Vegetables* on the original MyPlate).

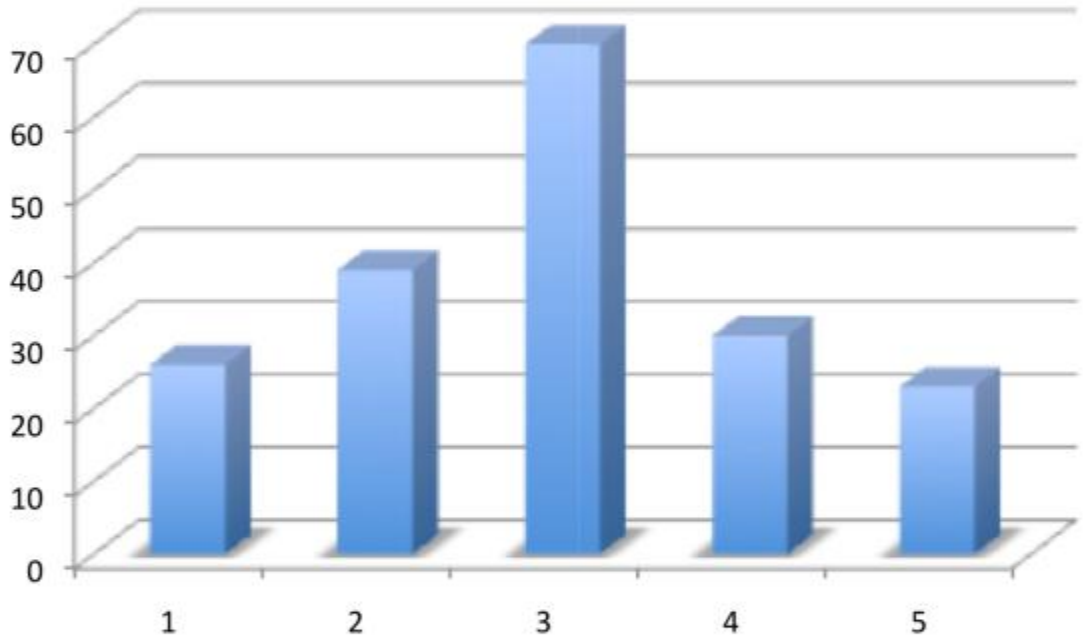
Vision Statement #3: We teach our students and staff how to prepare healthy foods.

Q: How will we measure our progress toward our vision of teaching our students and staff how to prepare healthy foods?

A: We will periodically survey students and staff, asking them to rate themselves on a scale of 1-5 on healthy food preparation ability.

Q: What is current student ranking on healthy food preparation ability?

A: The majority of Coronado students ranked themselves at least as a 3, which indicated that they feel as though they can cook *some* healthy foods.



Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can integrate healthy cooking curriculum into life skills classes. Additionally, hands-on cooking demonstrations can be given periodically to students and staff.

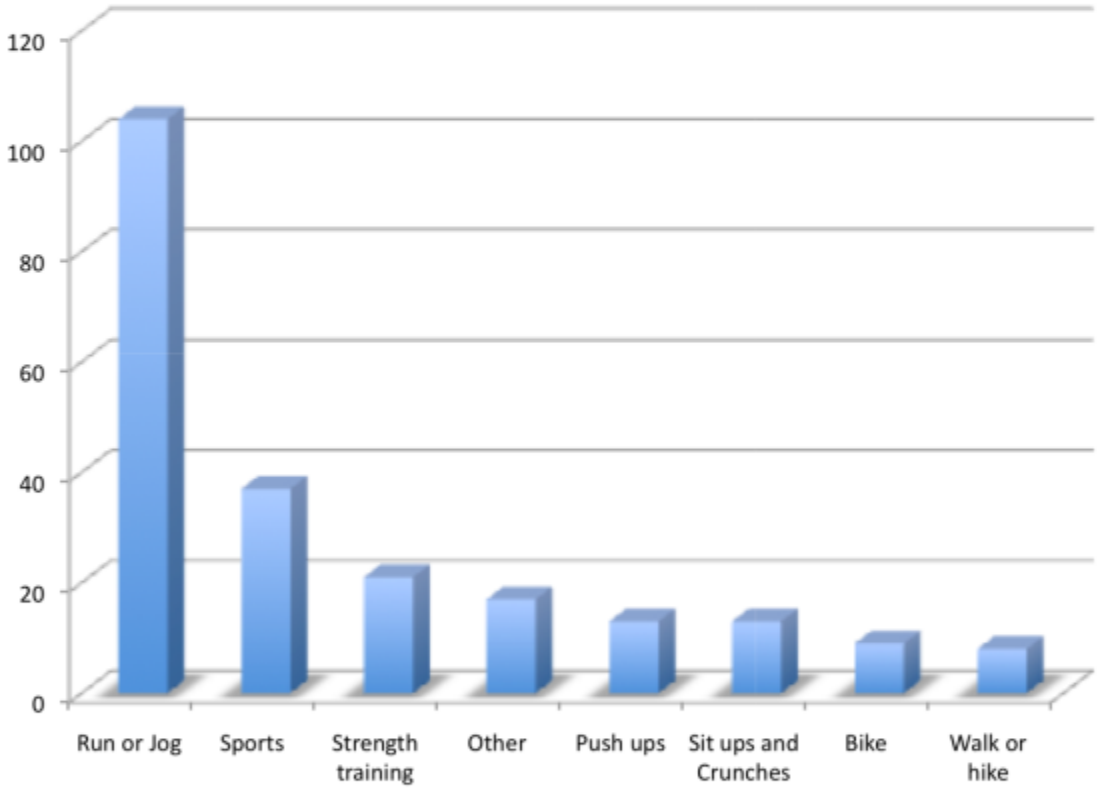
Vision Statement #4: We teach our students and staff how to be active.

Q: How will we measure our progress toward our vision of teaching our students and staff how to be active?

A: We will periodically survey students and staff, asking them to identify which exercises they feel competent in.

Q: What is exercises do students currently feel most competent in?

A: The majority of Coronado students feel competent in running or jogging.



Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can develop a non-competitive running club for students and staff to build on their running skills and techniques. Coronado can continue to teach a variety of exercises through Coronado P.E. department.

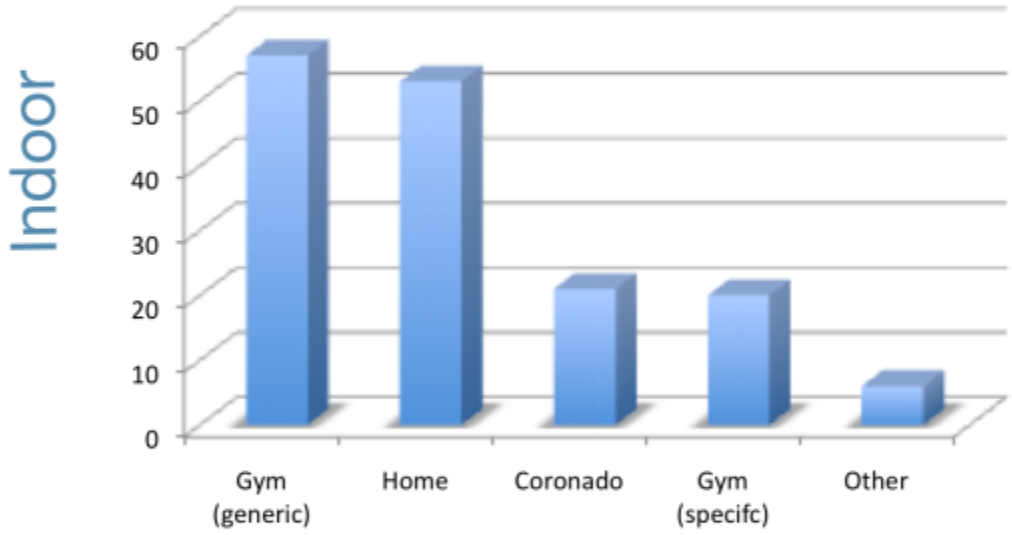
Vision Statement #5: We teach our students and staff where to be active.

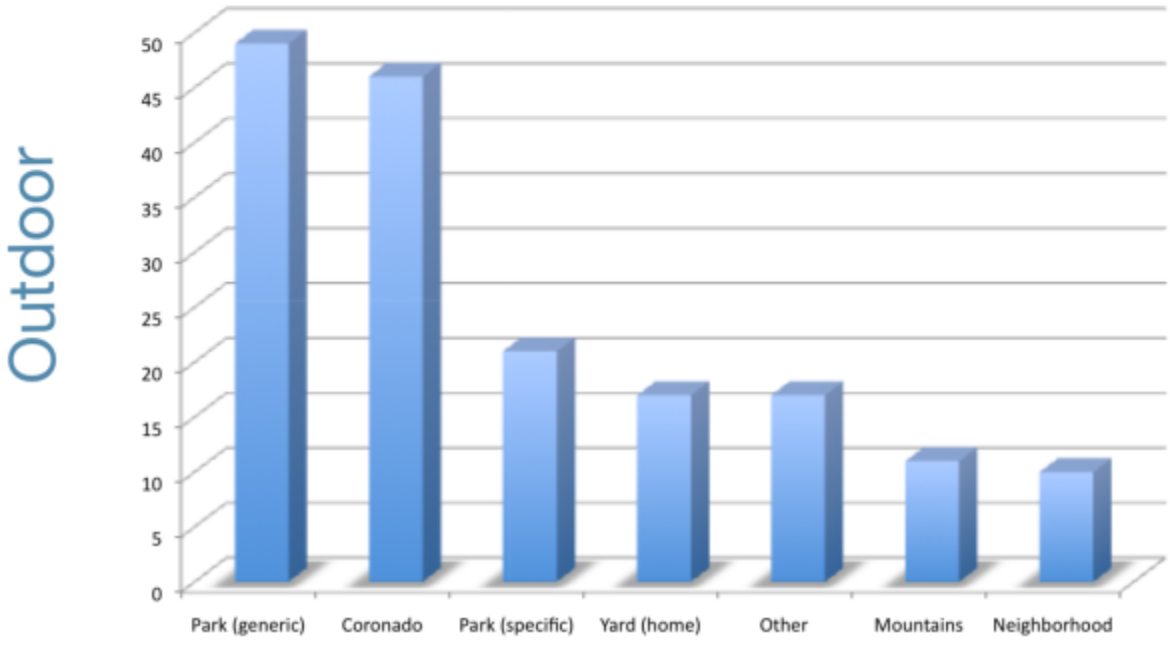
Q: How will we measure our progress toward our vision of teaching our students and staff where to be active?

A: We will periodically survey students and staff, asking them to identify where they go to engage in physical activity (both indoor and outdoor)?

Q: Where are Coronado students currently going to engage in physical activity?

A: Many Coronado students identified Coronado as a place that they were likely to exercise, both indoor and outdoor. The Coronado track was referenced by many students as an outdoor place where they feel comfortable being active.





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Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can offer after school opportunities for Coronado students and staff to use the track and other Coronado fitness facilities. Coronado can also offer information to students and staff about places in their community where there are opportunities to be active.

Vision Statements - Infrastructure:

Schools can also create change through infrastructural changes, which make the built environment of the school more sustainable. This not only includes changes inside the school building, but also those changes that are visible to the larger community. School gardens, solar panels, and water efficient landscaping are a few examples, along with improved sidewalks, bike racks, and play areas.

Vision Statement #6: Our school is walkable and bikeable.

Q: How will we measure our progress toward our vision of making our school more walkable and bikeable?

A: There are several excellent tools for assessing school walkability and bikeability. The most comprehensive is an assessment through the Safe Routes to School program, created by the Arizona Department of Transportation. Their Active School Neighborhood Checklist (ASNC) is a tool for assessing school sites based on their walkability and bikeability.

Q: How walkable and bikeable is Coronado currently?

A: Although Coronado has not yet performed a full assessment of walkability and bikeability, according to the website Walkscore, which rates walkability through metrics like average block length, intersection density, link/node ratio, and route directness, Coronado scores a 65 out of 100 total points.

Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can engage in a full assessment through the Safe Routes to School Program. Additional opportunities may include engaging in student and staff challenges to bike or walk on certain days, or to earn points for these behaviors.

Vision Statement #7: Our school has indoor and outdoor recreational space.

Q: How will we measure our progress toward our vision of ensuring our school has indoor and outdoor recreational space?

A: This vision statement will be measure through annual audits of Coronado's indoor and outdoor recreational space.

Q: How much indoor and outdoor space for recreation does Coronado currently have?

A: Coronado's outdoor fitness facilities include an outdoor track, football field, soccer field, eight tennis courts, and two backstops for baseball and softball. Indoor facilities include a weight training room, dance studio, and gymnasium.

Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado has adequate indoor and outdoor recreational space, so proper maintenance of these facilities is the only future action required.

Vision Statement #8: Our school has a healthy school lunch program.

Q: How will we measure our progress toward our vision of ensuring our school has a healthy school lunch program?

A: Coronado will keep track of school foods that are coming from local and organic sources.

Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can advocate to the Scottsdale Unified School District for improvements upon the distributed school lunch menu items. Additionally, Coronado can do periodic audits of student consumption behaviors, in order to assess whether or not healthy food choices are actually being selected and consumed.

Vision Statement #9: Our school has a school garden.

Q: How will we measure our progress toward creating a school garden?

A: The school garden site will be assessed through checking off key infrastructural components that are in progress including: completed construction of raised beds, installation of watering infrastructure, fence installation, signage, compost pile, shaded seating.

Q: How complete is Coronado's school garden currently?

A: The fencing, electrical, and water supply are complete. Several raised beds are finished and several are in progress. There still needs to be an established compost system, as well as appropriate signage.

Q: What actions can Coronado take in the future to achieve this vision?

A: Future additions to the garden could include a toolshed or a greenhouse. Getting maximum utilization of the garden in its current state is essential, and a few community work days this spring could finish off the raised beds as well as increase community involvement.

Vision Statements - Outreach:

Schools can also create change through outreach activities, which include any events the school hosts, letters and other information distributed into the community, and community access to classes, lectures, or facilities that the school provides the community.

Vision Statement #10: We provide our community with opportunities to be active.

Q: How will we measure our progress toward our vision of providing opportunities for our community to be active?

A: We will assess what percentage of Coronado's recreational space (from Vision Statement 6) is accessible to all members of the community.

Q: What percentage of Coronado's recreational space is currently accessible to all members of the community?

A: Coronado's fitness facilities are not currently open to the public.

Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can open up recreational spaces to all members of the community. Additionally, Coronado can host recreational sports leagues or sports events that are open to all community members. Coronado can also build partnership with local fitness facilities to provide community discounts.

Vision Statement #11: We share information about nutrition and healthy living with our community.

Q: How will we measure our progress toward sharing information about nutrition and healthy living with our community?

A: We will monitor the healthy living information that is distributed through our school newsletters and other events.

Q: How much information about healthy living is Coronado currently sharing with its community?

A: Healthy living information is not currently a part of the Coronado outreach activities.

Q: What actions can Coronado take in the future to achieve this vision?

A: Coronado can include more information about healthy living in its community outreach efforts. Additionally, it would be helpful to distribute the nutrition health survey to the community in order to assess community healthy knowledge.

Vision Statement #12: We allow community involvement in our school garden.

Q: How will we measure our progress toward fostering community involvement in our school garden?

A: We will utilize a sign-in sheet at all of our public school garden events and workdays, collecting not only names but also how individuals are connected with our school.

Q: How involved is the community currently in our school garden?

A: Our garden is still in the development process, and community involvement will begin this spring.

Q: What actions can Coronado take in the future to achieve this vision?

A: Community invitations to school garden workdays should be distributed, and school garden events should be planned for the future.

Concluding Remarks

We believe that these actions on the part of our school will play a significant role in the fight against childhood obesity in our community. We would also like to note that advocacy is an important component of this fight, and we would like to advocate on the national level for the following:

1. Healthier school lunch guidelines, which will allow schools to fund purchasing of more fresh fruits and vegetables for students.
2. Clean water, food, and air, since pollutants have shown to have significant effects on childhood obesity.
3. Changes to the Farm Bill, so that subsidies are given to farmers growing fruits and vegetables rather than grains and sugars.
4. Funding for school gardens form both the sate and national levels.
5. Food access justice, so that all members of our community have access to healthy food and not only those of us in high income brackets.

Though the process of reversing this problem will be gradual, we have faith that our school can play a significant role in the long term process of reversing this trend. This action plan is different from other approaches because it has used a sustainability science approach, which incorporates issues like social justice and environmental considerations into our action plan.

APPENDIX C: VALLEY VIEW ELEMENTARY ACTION PLAN

VALLEY VIEW ELEMENTARY SCHOOL

A Sustainable Approach to Solving Childhood Obesity Through Education, Community Outreach, and Environmental Change

Produced in collaboration with

Arizona State University

School of Sustainability

PhD Candidate Tamara Lawless

Introduction

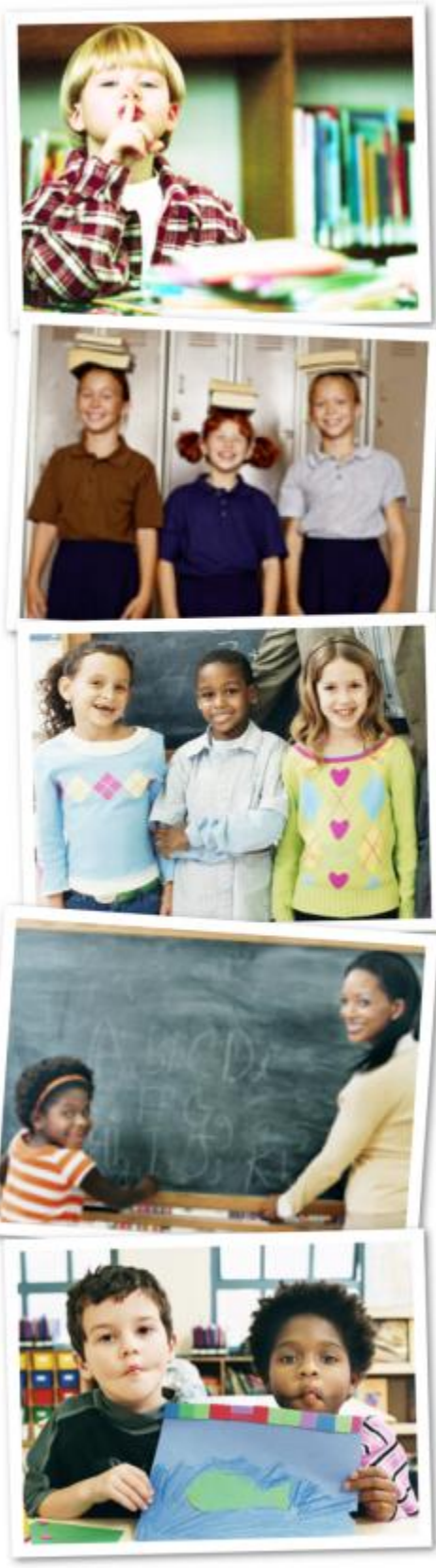
The Arizona State University School of Sustainability and Valley View Elementary School began collaborating on science for sustainability during academic year 2010-2011. During this time, Valley View teachers and students were engaged regularly with school gardening curriculum, which was coordinated by Farm-to-School Instructor Brett Smith with assistance from the ASU School of Sustainability researcher Tamara Lawless.

During the second year of collaboration, representatives from Valley View collaborated with two other area K-12 schools: Valley View High School and South Pointe High School, to tackled a shared sustainability problem: childhood obesity.

Childhood obesity is a sustainability problem because:

1. Children who suffer from childhood obesity grow up to be adults with significantly higher rates of diabetes, cardiovascular disease, and other health problems; making them the first generation with a lower life expectancy than their parents.
2. Agricultural practices that are damaging to the environment are used to produce the excessive quantities of U.S. Farm Bill subsidized commodity crops that are made into unhealthy foods like corn syrup which contribute to childhood obesity.
3. Childhood obesity is more prevalent in low-income communities where food deserts and unsafe conditions are more prevalent, widening rather than eliminating the gap between rich and poor by adding health problems to the list of challenges for those already struggling to get by.
4. Many of the upstream factors that lead to childhood obesity, such as legislation like the U.S. Farm Bill, community designs that lack bike lanes and sidewalks, food deserts and discriminatory zoning, and school lunch programs that are filled with unhealthy foods are established without the participation of the citizens most affected by them.

The Valley View team and the other participating schools used sustainability problem solving methods to create a vision for a future without childhood obesity, with a specific focus on the role schools can play in achieving this vision. The following pages provide detail on the vision they created, and on the steps Valley View can take in the future to achieve it. For details on how to use this process to solve other sustainability problems, please review the accompanying Sustainability Problem Solving Guide for Schools.



Vision Statements - Education:

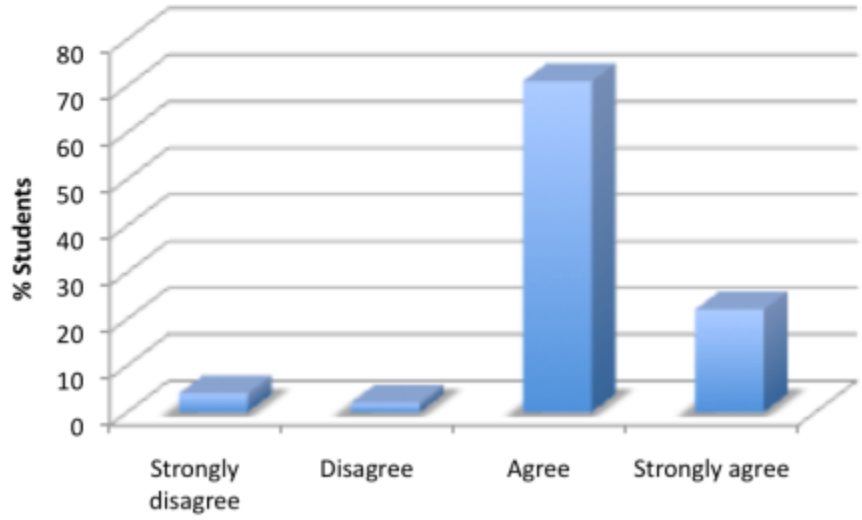
Schools can create change through their educational activities, which are direct learning experiences provided for students, faculty, staff, and community members. This is not limited to what students learn in the classroom, but also includes knowledge that is internalized by the faculty and staff of the school and knowledge that students, faculty, and staff share with their friends and families.

Vision Statement #1: We teach our students and staff which foods are healthy.

Q: What is Valley View currently doing to ensure that students and staff know which foods are healthy?

A: Valley View's 7th and 8th grade students are participating in a new health curriculum called My Healthy World. My Healthy World includes information about healthy eating and about maintaining an active lifestyle. Students take course pre-assessments which provide a baseline of student knowledge about healthy food and at the end of the course, post tests are also administered to the students. Additionally, next year Valley View is implementing a new school food policy that will eliminate junk foods and sodas from the school grounds.

Data from the first round of student participation in My Healthy World reveals that the majority of Valley View students agree or strongly agree with the statement, "I understand how food affects my health."



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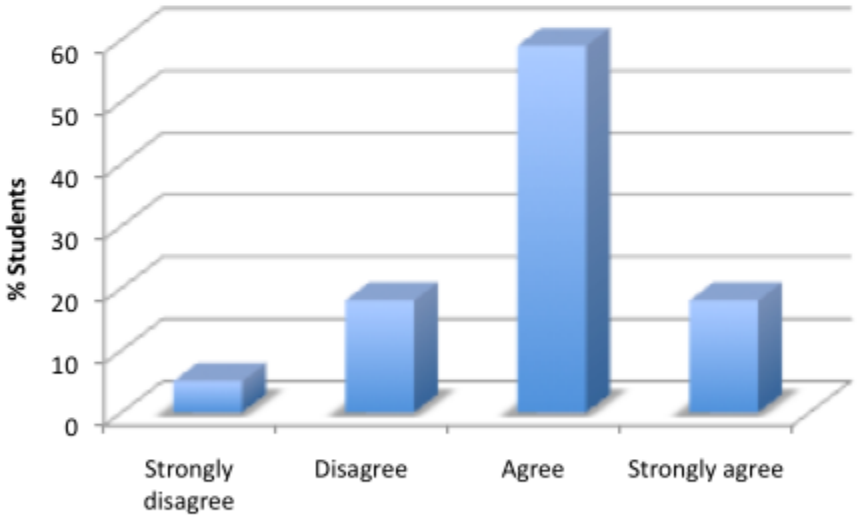
Q: What actions can Valley View take in the future to ensure that students and staff know which foods are healthy?

A: Valley View can continue to administer the My Healthy World curriculum to its older students. Additionally, Valley View can seek to add My Plate posters, or other interpretive information relating to health food choices to common areas, likes the school cafeteria.

Vision Statement #2: We teach our students and staff where to get healthy food.

Q: What is Valley View currently doing to ensure that students and staff know where to get healthy foods?

A: Valley View has not yet initiated efforts to increase staff and student knowledge about where to get healthy food. However, Valley View has engaged in a fruits and vegetables grant which provides fresh fruits and vegetables to students during school hours, making Valley View a location where students can obtain healthy food. Data from the first round of student participation in My Healthy World reveals that the majority of Valley View students agree or strongly agree with the statement, "I know how to make healthy food choices."



Q: What actions can Valley View take in the future to ensure that students and staff know where to get healthy foods?

A: Valley View can include information about local grocery stores and farmer's markets with good healthy food selections to parents, staff, and students during the beginning of the school year health training that will accompany the school's new campus food policy.

Vision Statement #3: We teach our students and staff how to prepare healthy foods.

Q: What is Valley View currently doing to ensure that students and staff know how to prepare healthy foods?

A: Valley View is planning to incorporate healthy food preparation knowledge into community workshops in the future. The beginning of school year 2013-2014 will include training on the implementation of Valley View's changes to the school food policy, providing an opportunity to provide these workshops.

Q: What actions can Valley View take in the future to ensure that students and staff know how to prepare healthy foods?

A: Valley View can implement healthy food preparation workshops with students, staff, and their families. Additionally, Valley View can seek collaboration with other organizations working on this challenge, such as the Orchard Community Learning Center and Roosevelt School District's new community school.

Vision Statement #4: We teach our students and staff how to be active.

Q: What is Valley View currently doing to ensure that students and staff know how to be active?

A: Valley View students are enrolled in Physical Education courses. Additionally, the middle school aged students are enrolled in a new health curriculum called My Healthy World. My Healthy World includes information about maintaining an active lifestyle. Students take course pre-assessments which provide a baseline of student knowledge about active lifestyle and at the end of the course, post tests are also administered to the students. Staff and teachers at Valley View have the opportunity to participate in after-school fitness gatherings.

Q: What actions can Valley View take in the future to ensure that students and staff know how to be active?

A: Valley View can increase student and staff activity time by building more physical movement into the school schedule. This may include framing these experiences as study breaks, rather than as recess, in order to align with state standards.

Vision Statement #5: We teach our students and staff where to be active.

Q: What is Valley View currently doing to ensure that students and staff know where to be active?

A: Valley View has opened it's school grounds for community recreational usage, including the basketball hoops, softball and baseball backstops, and soccer field. Additionally, Valley View has partnered with an outside organization to provide supervise active play after school several days a week for students, with a late bus provided to get students home safely.

Q: What actions can Valley View take in the future to ensure that students and staff know where to be active?

A: Valley View can provide its students and staff with knowledge about other opportunities for fitness in the community. This includes nearby parks, schools, fitness facilities, and community recreation centers. Additionally, there is potential to partner with facilities that require a fee to arrange a discount for Valley View families.

Vision Statements - Infrastructure:

Schools can also create change through infrastructural changes, which make the built environment of the school more sustainable. This not only includes changes inside the school building, but also those changes that are visible to the larger community. School gardens, solar panels, and water efficient landscaping are a few examples, along with improved sidewalks, bike racks, and play areas.

Vision Statement #6: Our school is walkable and bikeable.

Q: How will we measure our progress toward our vision of making Valley View more walkable and bikeable?

A: There are several excellent tools for assessing school walkability and bikeability. The most comprehensive is an assessment through the Safe Routes to School program, created by the Arizona Department of Transportation. Their Active School Neighborhood Checklist (ASNC) is a tool for assessing school sites based on their walkability and bikeability.

Q: How walkable and bikeable is Valley View currently?

A: Although Valley View has not yet performed a full assessment of walkability and bikeability, according to the website Walkscore, which rates walkability through metrics like average block length, intersection density, link/node ratio, and route directness, Valley View scores a 37 out of 100 total points.

Q: What actions can Valley View take in the future to ensure that Valley View becomes a more walkable and bikeable place?

A: Valley View can engage in a full assessment through the Safe Routes to School Program. Additional opportunities may include engaging in student and staff challenges to bike or walk on certain days, or to earn points for these behaviors.

Vision Statement #7: Our school has indoor and outdoor recreational space.

Q: How much indoor and outdoor space for recreation does Valley View currently have?

A: Valley View's outdoor fitness facilities include a soccer field, three outdoor basketball courts, a playground, two backstops for softball and baseball, and a small practice field. Indoor facilities include an indoor gymnasium as well as classroom space that is used for staff fitness activities after school hours.

Q: What actions can Valley View take in the future to ensure that Valley View's indoor and outdoor recreational spaces improve?

A: Valley View has can continue to improve the quality of its recreational spaces, and when possible can move forward on the planned phase two of its fitness infrastructure improvements.

Vision Statement #8: Our school has a healthy school lunch program.

Q: How healthy is Valley View's school lunch program currently?

A: Valley View is in the process of implementing a radical new school food policy for foods brought from home and for competitive foods served in the cafeteria. The new policies will include:

- Elimination of sugar-laden food items (including candy and sodas).
- Elimination of multi-serving bags of chips and other junk foods.
- Requirement that students consume fresh fruits and vegetables at snack time.
- Elimination of food consumption during recess.

These changes will be enforced after a training period at the beginning of academic year 2013-2014 for students, staff, and parents. Data from the first round of student participation in My Healthy World reveals that the majority of Valley View students are currently consuming the recommended servings of fruits or vegetables on, "some days," "few days" or not at all (see graph on following page.)

Q: What actions can Valley View take in the future to ensure that Valley View has a healthy school lunch program?

A: Valley View can implement the planned school food policy changes. Additionally, Valley View can continue to work with the Roosevelt School District to improve the healthfulness of the district school lunches, including the introduction of more local and sustainably grown products.

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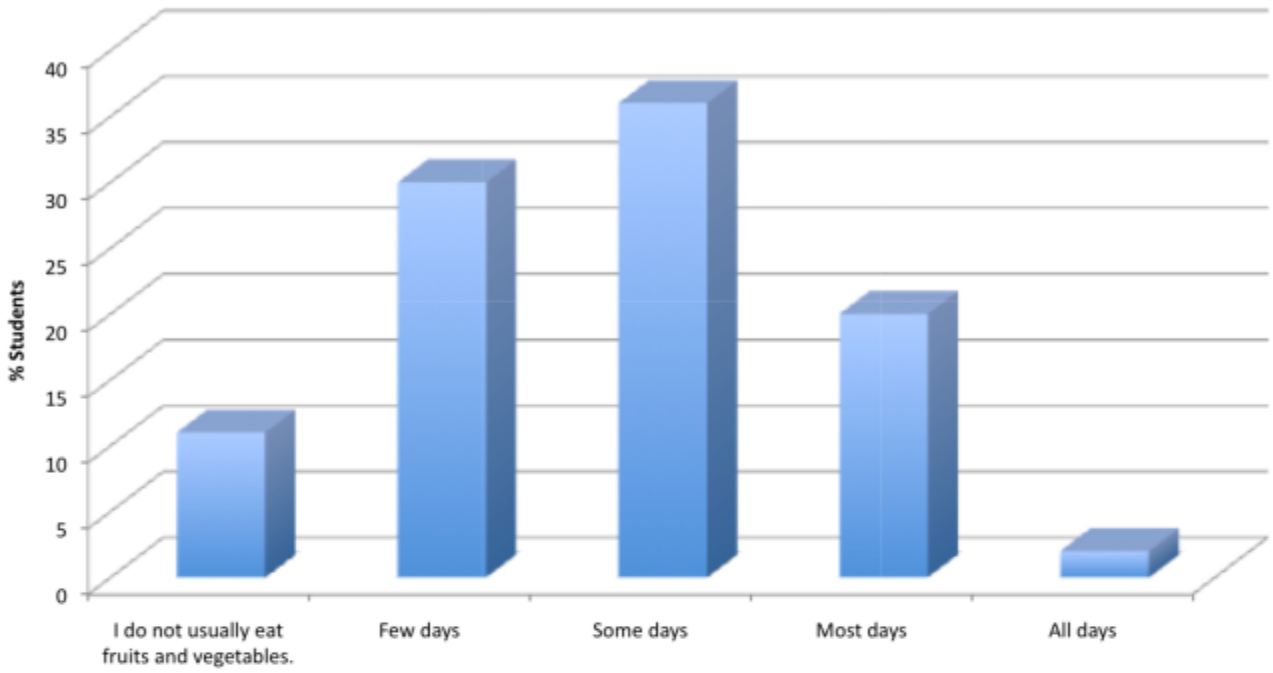
Student response to the prompt: During the past week I ate five or more servings of fruits or vegetables.



Vision Statement #9: Our school has a school garden.

Q: What is the current utilization of Valley View's school garden facilities?

A: Valley view has many small school garden sites available on campus, as well as farm animal enclosures that are inhabited by chickens, goats, geese, and ducks. The garden sites were heavily used in past years, but have seen less use during the past academic year due to personnel changes.

Q: What actions can Valley View take in the future to ensure that the school's gardens are available for student learning?

A: A volunteer farm-to-school coordinator could provide Valley View students with opportunities to use the school garden facilities. This volunteer position could be recruited from Valley View's community members, both parents and neighbors.

Vision Statements - Outreach:

Schools can also create change through outreach activities, which include any events the school hosts, letters and other information distributed into the community, and community access to classes, lectures, or facilities that the school provides the community.

Vision Statement #10: We provide our community with opportunities to be active.

Q: What active opportunities is Valley View providing its community?

A: Valley View has opened it's school grounds for community recreational usage, including the basketball hoops, softball and baseball backstops, and soccer field. Additionally, Valley View has partnered with an outside organization to provide supervise active play after school several days a week for students, with a late bus provided to get students home safely.

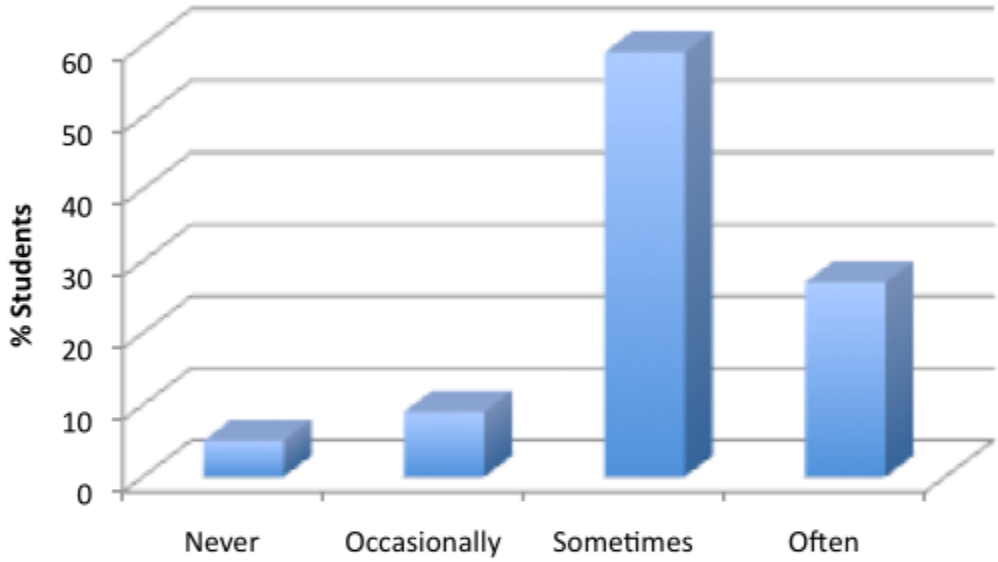
Q: What actions can Valley View take in the future to increase its active opportunities for the community?

A: Valley View can host recreational sports leagues or sports events that are open to all community members. Examples could include soccer games, field days, or partnerships with outside organizations to use Valley View facilities for fitness after school hours.

Vision Statement #11: We share information about nutrition and healthy living with our community.

Q: What information about nutrition and healthy living is Valley View providing its community?

A: Valley View is planning to incorporate information about nutrition and healthy living into its training sessions for the upcoming changes to the school food policy. According to data from the first round of student participation in My Healthy World, the majority of Valley View students say that they ***sometimes*** eat healthy food with their families.



Q: What actions can Valley View take in the future to ensure that they are sharing knowledge about nutrition and healthy living with its community?

A: Valley View can include more information about healthy living into its current community outreach letters and e-mails. Additionally, Valley View can send extra information home with students about nutrition and healthy living.

Vision Statement #12: We allow community involvement in our school garden.

Q: How can Valley View incorporate community involvement into the school garden?

A: Valley View can recruit a volunteer farm-to-school coordinator from the community. This point person could arrange for volunteer days for garden maintenance, or even to work as garden educators for Valley View students. Broadmor Elementary in Tempe is an excellent model on this.

Concluding Remarks

We believe that these actions on the part of our school will play a significant role in the fight against childhood obesity in our community. We would also like to note that advocacy is an important component of this fight, and we would like to advocate on the national level for the following:

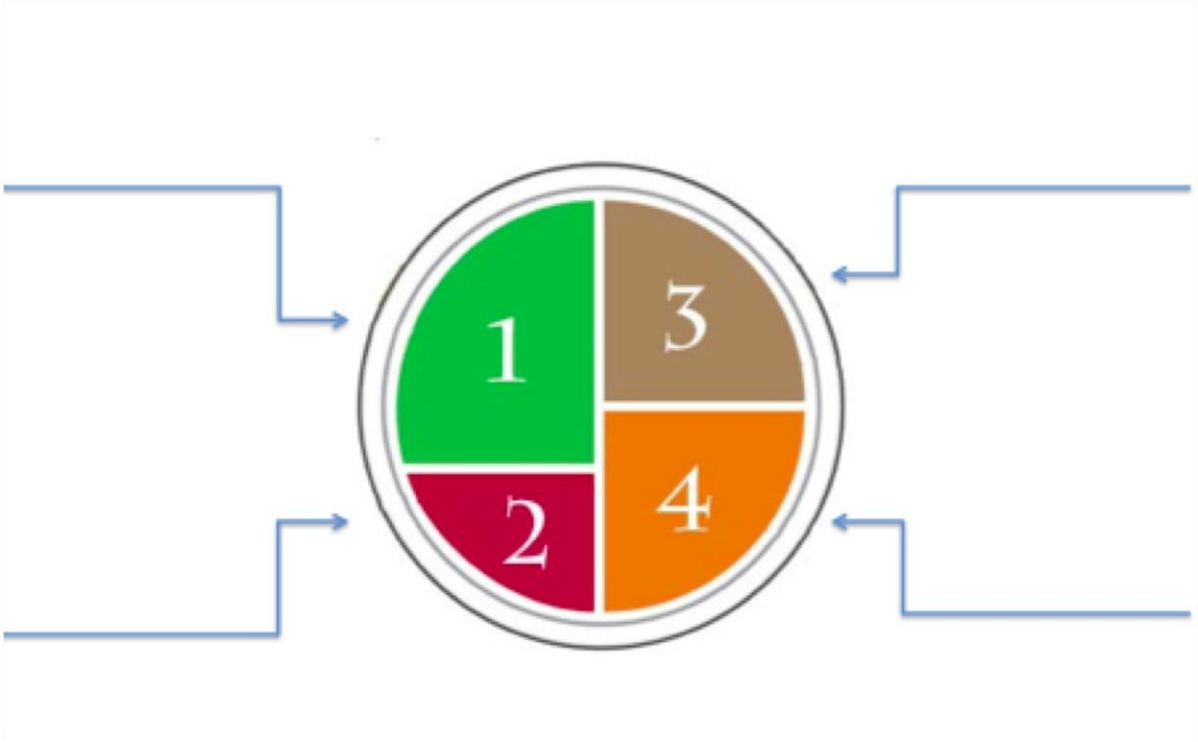
1. Healthier school lunch guidelines, which will allow schools to fund purchasing of more fresh fruits and vegetables for students.
2. Clean water, food, and air, since pollutants have shown to have significant effects on childhood obesity.
3. Changes to the Farm Bill, so that subsidies are given to farmers growing fruits and vegetables rather than grains and sugars.
4. Funding for school gardens form both the sate and national levels.
5. Food access justice, so that all members of our community have access to healthy food and not only those of us in high income brackets.

Though the process of reversing this problem will be gradual, we have faith that our school can play a significant role in the long term process of reversing this trend. This action plan is different from other approaches because it has used a sustainability science approach, which incorporates issues like social justice and environmental considerations into our action plan.

APPENDIX E: SURVEYS AND IRB CONSENT FORMS

Healthy Life Survey

1. This is a picture of a plate of food, with four types of food on it: **protein**, **fruits**, **vegetables**, and **grains**. Use these four words to label the plate according to how much room each type of food should take up on your plate if you are eating healthy.



2. If you were told to go get yourself some healthy food, where would you go?

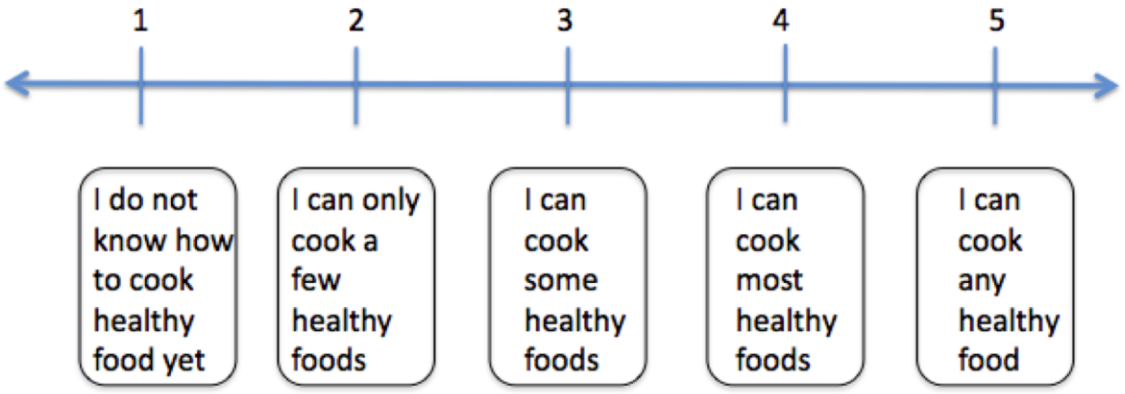
3.Name one way to exercise **that you know how to do**:

4. Name one indoor place and one outdoor place **where you like to exercise**:

Indoor:

Outdoor:

5. Circle the number that best describes how comfortable you feel about cooking healthy food.



Harnessing the impact of schools: How four schools in the Phoenix Metropolitan Area built sustainable communities together

My name is Tamara Lawless. I work at Arizona State University.

I am asking you to take part in a research study because I am trying to learn more about how schools can work together to make their communities more sustainable. Specifically, I want to learn about the steps schools can take to improve childhood obesity. Your parent(s) have given you permission to participate in this study.

If you agree, you will be asked to attend three workshops here at ASU along with some of the teachers from your school, your parent or guardian, and someone like the principal or vice principal of your school. Similar groups from several other schools in the area will also attend the workshops and everyone will work together to come up with ideas about what we can do to fix this problem.

You do not have to be in this study. No one will be mad at you if you decide not to do this study. Even if you start the study, you can stop later if you want. You may ask questions about the study at any time.

If you decide to be in the study I will not tell anyone else how you respond or act as part of the study. Even if your parents or teachers ask, I will not tell them about what you say or do in the study.

Signing here means that you have read this form or have had it read to you and that you are willing to be in this study.

Signature of subject_____

Subject's printed name _____

Signature of investigator_____

Date_____

Four schools in the Phoenix Metropolitan Area strengthen community sustainability

Date:

Dear participant,

This research study will help us learn how schools can work together to make their communities more sustainable. The specific sustainability problem that we will be addressing in this study is childhood obesity. Your participation will involve attending three 2-hour workshops with other participants from your school and teams from several other schools in the Phoenix Metropolitan Area.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty,

Each school in this study will be guided through the process of creating specific steps they can use to improve their school's outreach programs, infrastructure, and educational activities so that they can better address childhood obesity. Additionally, every participant will receive copies of the process we use and the data we collect during the workshops. There are no foreseeable risks or discomforts to your participation.

Your responses will be anonymous. All of the ideas that we come up with during the workshops will be written down as general statements, with no names or other identifiers attached. The results of this study may be used in reports, presentations, or publications but your name will not be known.

If you have any questions concerning the research study, please contact the research team at: tlawless@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Sincerely,

Tamara Lawless

By signing below, I am indicating that I understand that my participation in these workshops is completely voluntary and that I can choose to end my participation at any time. I understand that the ideas produced from these workshops may be used in reports, presentations, or publications and my name will not be used.

Signature: Printed name: Date:

Harnessing the impact of schools: How four schools in the Phoenix Metropolitan Area built sustainable communities together

Date:

Dear participant,

This research study will help us learn how schools can work together to make their communities more sustainable. The specific sustainability problem that we will be addressing in this study is childhood obesity. Your participation will involve attending three 2-hour workshops with other participants from your school and teams from several other schools in the Phoenix Metropolitan Area.

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Sincerely,

Tamara Lawless

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RECRUITMENT LETTER

3/29/12

Dear Students, Parents/Guardians, and Community Members,

I am a graduate student under the direction of Professor Arnim Wiek in the School of Sustainability at Arizona State University.

I am conducting a research study to learn how schools can work together to make their communities more sustainable. The specific sustainability problem that we will be addressing in this study is childhood obesity. I am inviting the participation of students and their parent(s) or guardian(s), which will involve attending three 2-hour workshops this spring with other participants from your school and teams from several other schools in the Phoenix Metropolitan Area.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty,

Each school in this study will be guided through the process of creating specific steps they can take to improve their school's outreach programs (like community activities or special events where people other than teachers and students come to school), infrastructure (or the way our building and school yard is set up), and educational activities so that they can better address childhood obesity. Every participant will receive copies of the process we use and the data we collect during the workshops. There are no foreseeable risks or discomforts to your participation.

Your responses will be anonymous. All of the ideas that we come up with during the workshops will be written down as general statements, with no names or other identifiers attached. The

results of this study may be used in reports, presentations, or publications but your name will not be known.

If you have any questions concerning the research study, please contact the research team at: tlawless@asu.edu.

If you are interested in attending these workshops, please give the name(s) of the student and the interested parent or guardian to the teacher who gave you this letter.

Sincerely,

Tamara Lawless

Harnessing the impact of schools: How four schools in the Phoenix Metropolitan Area built sustainable communities together

3/29/12

Dear Teacher or Administrator,

As you know, I am a graduate student under the direction of Professor Aaron Golub in the School of Sustainability at Arizona State University.

I am conducting a research study to learn how schools can work together to make their communities more sustainable. The specific sustainability problem that we will be addressing in this study is childhood obesity. I am inviting your participation, which will involve attending three 2-hour workshops this spring with other participants from your school and teams from several other schools in the Phoenix Metropolitan Area.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty,

Each school in this study will be guided through the process of creating specific steps they can use to improve their outreach programs, infrastructure, and educational activities so that they can better address childhood obesity. Additionally, every participant will receive copies of the process we use and the data we collect during the workshops. This data will include any notes taken on the ideas and discussions that occur during the workshops, as well as a short pre-test and post-test taken by each participant. There are no foreseeable risks or discomforts to your participation.

Your responses will be anonymous. All of the ideas that we come up with during the workshops will be written down as general statements, with no names or other identifiers attached. The results of this study may be used in reports, presentations, or publications but your name will not be known.

If you have any questions concerning the research study, please contact the research team at: tlawless@asu.edu. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Please send me an e-mail at tlawless@asu.edu to confirm your interest in participating in this study.

Sincerely,

Tamara Lawless

Entrance Survey
School – Community Sustainability Workshops

Name: _____

School:_____

1. On a scale of 1-5, how well do you feel you understand sustainability? (have you read about it, heard about on TV, working on it yourself, etc)

1 2 3 4 5

Do not understand I am an expert!

2. Please provide a brief definition of sustainability:

3. On a scale of 1-5, how capable do you feel you are in working on sustainability problems? (how willing and comfortable do you feel, do you have enough knowledge and information)

1 2 3 4 5

Not capable Very capable

4. On a scale of 1-5, how embedded is your school in its community? (are there strong community outreach programs, do community members come to school events, are many of the students from the surrounding community)

1 2 3 4 5

Not embedded Very embedded

Exit Survey
ASU Sustainability Collaboration

1. During this process, we used some "sustainability problem solving tools" to do things like create a vision, and think about childhood obesity from many different angles. Do you feel like you have a better understanding of sustainability after our work together?

(y/n)

2. How comfortable would you feel using these tools on your own in the future if you were given instructions for doing so?

a) Very uncomfortable
b) Uncomfortable
c) Neither uncomfortable or comfortable
d) Comfortable
e) Very comfortable

3. What do you feel are the top three barriers schools face when trying to make positive change (like the work we have been doing together)?

4. What is one thing that has helped move this work forward for your school?